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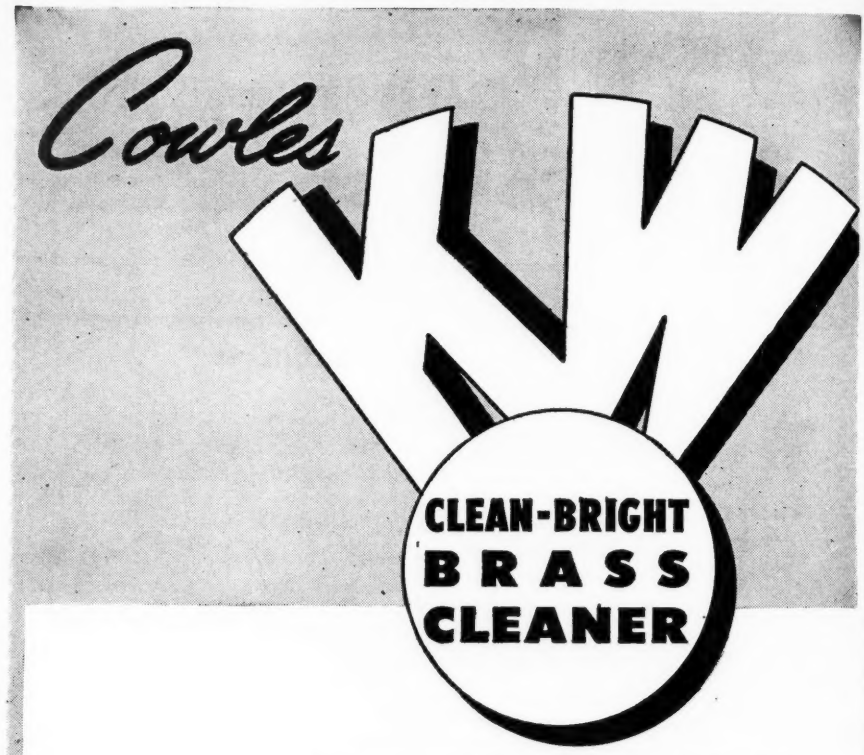

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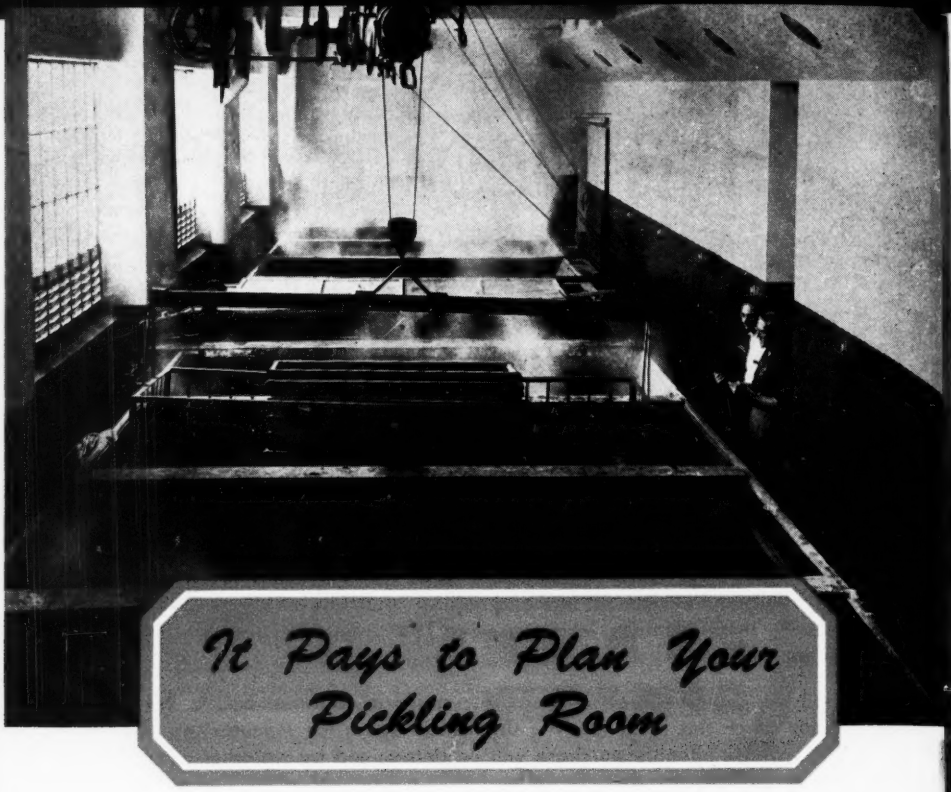
The New Year

If we assume that the good Lord will help us find a way of living together peaceably in a world inhabited by the atomic bomb, then perhaps we may be pardoned the audacity of assuming further that this new babe just born will live his allotted time and eventually die of ripe old age and natural causes as all others have done before. Granting these premises, let us see what 1946 should have in store for the finishing trades.

First of all, we should witness a return to competitive business and to the host of implications which this involves. We should see again the manufacture of finished products whose ultimate purchase will be determined by customer appreciation. Evaluation by the consumer should become more critical as finished merchandise grows more abundant and the average man discovers to his satisfaction that a choice is once more his to make.

The year 1946 should mark the death and burial of the age-old bogey, trial and error. Four years of all-out war without regard to expenditure have cinched the value of modern planning, engineering and technological methods. Accurately designed and operated machinery and scientifically compounded plating and finishing solutions will produce more goods of high quality in a given time than old fashioned hit-and-miss methods. This being common knowledge, few of us will want to return to the old ways and still more obsolete equipment will be junked and replaced this year.

The significance of pH has been established and will become more universally recognized. Improved methods of analysis, testing and control invented during the war will continue to be applied in increasing volume in our shops this year. The finisher is going to find it easier to produce and infinitely simpler to guarantee results. He is also going to find a growing demand for quality in his work, for the American people are going to be his judges. These judges are going to learn once more to keep their dollars in their pockets rather than spend them for inferior workmanship.



It Pays to Plan Your Pickling Room

By MERTON SMITH and RICHARD CARNO
O'Keefe and Merritt Corporation

THE pickle room is usually the most neglected feature of the porcelain enameling plant. Usually, it is located in some portion of the building for which a better use could not be found. In most instances, little thought has been given to tank arrangement, lighting, ventilation, temperature control, and safety factors. In short, in the average plant little basic engineering work has been done to ensure that the pickle room will serve its purpose efficiently, safely, economically.

Studies have shown that a very considerable proportion of the troubles which arise in porcelain enameling can be traced back to the pickling room. The proper conditioning of the metal surface is all important in the successful adhesion of the porcelain enamel coating. If the output of the pickle room is not uniformly clean and free of oxide, the finished product will vary greatly in quality, and the number of rejects will run high. Taking the "bugs" out of the pickling operation will result in smoother operation of the porcelain enameling

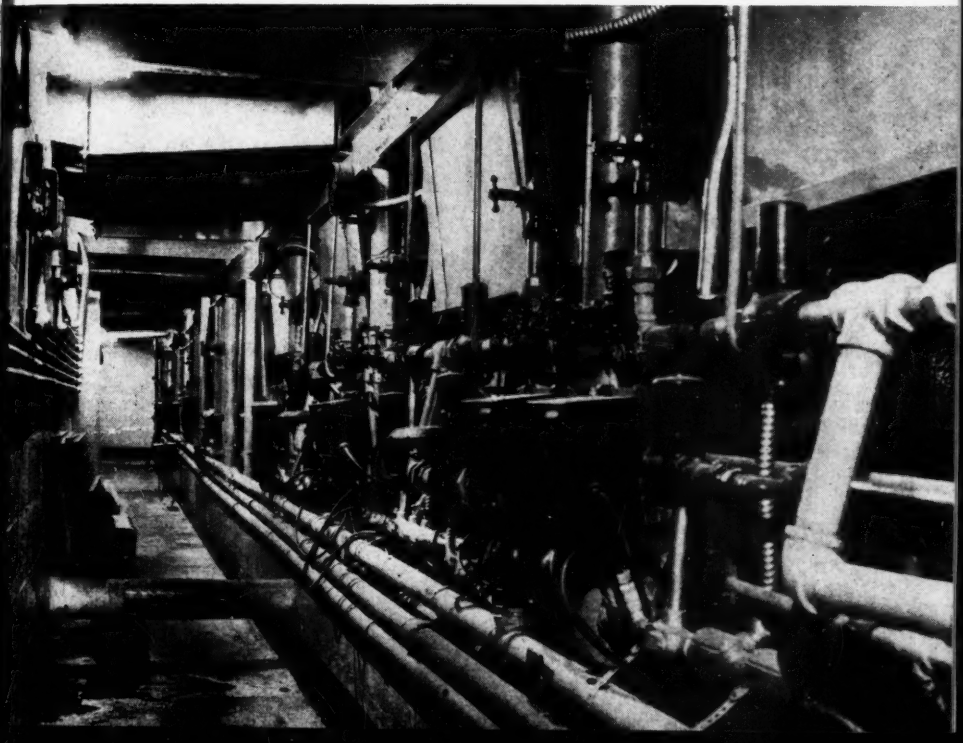
General view of the new pickling room in the porcelain enameling department of the O'Keefe and Merritt plant in Los Angeles. Air conditioned, brightly lighted, and scientifically arranged, the room is planned for top speed, high quality production.

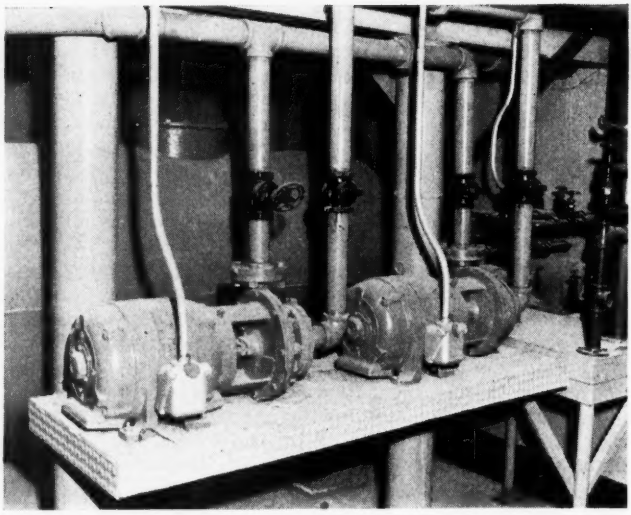
plant as a whole. At O'Keefe and Merritt, it was decided that it would pay substantial dividends to redesign and rebuild the pickle room, and in this process to apply some basic engineering concepts which would place the pickling operation under complete, scientific control.

In making basic plans for a new pickle room at O'Keefe and Merritt, we started with the position of the operator. Cleaning and pickling is not a highly complicated technical operation, yet a good deal depends on the skill and judgement of the operator. It may take a year or more for the operator to get the "feel" of the job, so that work of uniformly high quality is produced. The fact must be faced, however, that no one is less envied than the operator of the average pickling room. He often works in a dark, damp, hot, fume-laden environment, and therefore has little incentive to stay on the job long enough to learn it thoroughly. One of our basic purposes in planning the new pickle room for O'Keefe and Merritt was to provide a safe, comfortable, working environment so that the labor turnover would be reduced to a minimum. This required planning for excellent lighting, air conditioning, and safety.

Our second major objective was to design an installation in which pickling results of uniformly high quality could be turned out in a fast, convenient manner. The factors involved here were the size and arrangement of the tanks, the method of transferring the work from one tank to another, and the methods of controlling the temperature of the

General view of subterranean control room, showing the manifolding system, the temperature control devices, and the provision made for both natural gas and fuel oil firing. All valves and equipment are in accessible locations for ease of inspection and maintenance.





In this small space, a 1,000-gallon acid storage tank, a 2,000-gallon reserve fuel oil tank, and the necessary pumping equipment are conveniently arranged.

various pickling solutions employed.

A Pleasant Working Environment

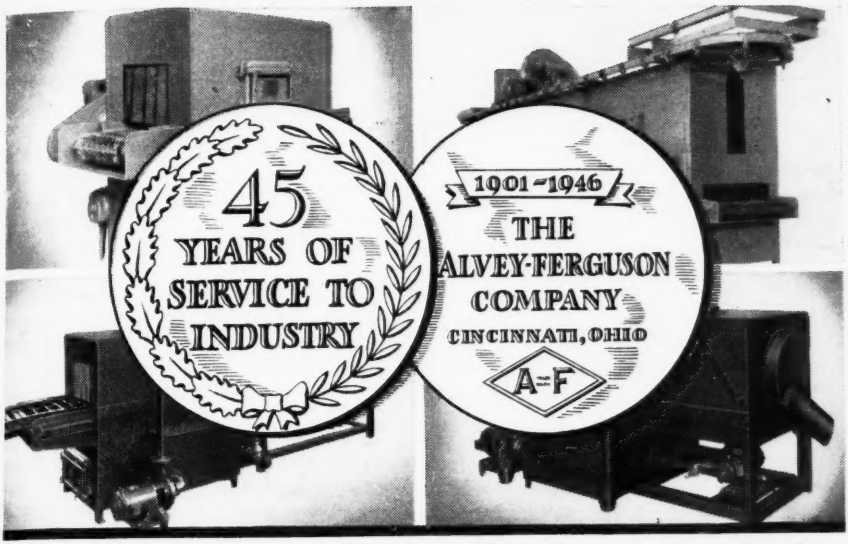
The provision of a pleasant working environment involved the installation of an effective air conditioning system, adequate lighting, and the planning of the pickling room layout so that waste motion would be avoided, and so that the room could be readily maintained in a clean and sanitary condition. The air in the pickling room is completely changed every forty-five seconds. The louvres are arranged along the walls in such a manner as to provide circulation of air without noticeable draft. Fumes are kept away from the walls, and are concentrated in the middle of the room, where they are exhausted. The vents are located behind the operator, who is therefore upwind from the fumes given off by acid tanks. The air being drawn into the conditioning system passes the exhaust stack, thereby exerting a cooling effect on it.

Ample illumination is provided, both through natural sources and through overhead, indirect electrical lighting. Since the pickle room operates on around-the-clock basis, considerable thought was given to the lighting system. The lights are arranged so that each tank can be illuminated individually, the greatest amount of light being made available in the working areas. A separate switch controls each light. The walls and the ceiling are finished in light colors to provide maximum light diffusion without glare.

The Tank Installation

Twelve conventional steel tanks were constructed, each tank having a capacity of 2,700 gallons. Wood had been used formerly in the construction of the acid tanks, but these were found to be short-lived. The acid tanks are now of steel, lined with acid-resistant plastic and further protected by a layer of acidproof brick installed over the plastic.

In designing the hot tanks, the objective was to achieve as high a rate of heat transfer as possible, while keeping the number of burners down to a minimum. Atmospheric burners are employed. The tanks are fired and exhausted from the same end by 10-inch U-tubes. Although the tube diameter is greater than that



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conventionally utilized, it is found that heat transfer efficiency approximates 75 per cent. Two external tubes are used for firing, and the inner tubes for exhaust. At the end of the tank, the tubes are manifolded to one exhaust stack. A divided bulkhead is introduced into the manifold to prevent one tube from influencing the other. The tubes are not welded, but are bolted to the bulkheads to facilitate disassembly and maintenance. They are sealed by internal and external lead gaskets.

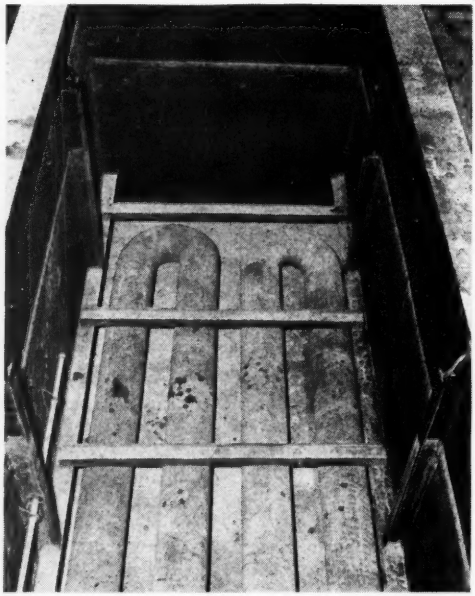
Natural gas is the fuel normally used for heating. The pilot flame is ignited by means of a spark plug. The flame for each hot tank is continuously scanned by a photoelectric cell. If the light goes out, a solenoid operated safety valve automatically cuts off the gas supply. At the same time, a warning buzzer is sounded, and a light goes on in a conspicuously located warning panel, indicating the location of the tank affected. In the event of total failure of the gas supply, temperature is maintained by an alternate oil-fired system, fueled from a 2,000-gallon reserve oil tank.

The tanks are manifolded to each other to permit neutralization of the acid solutions before drainage to the sewer, and to make it possible to transfer the contents of one tank to any other tank at will. Tank temperatures are maintained within a variation of five degrees by means of a conventional thermostatic control device.

The Processing Sequence

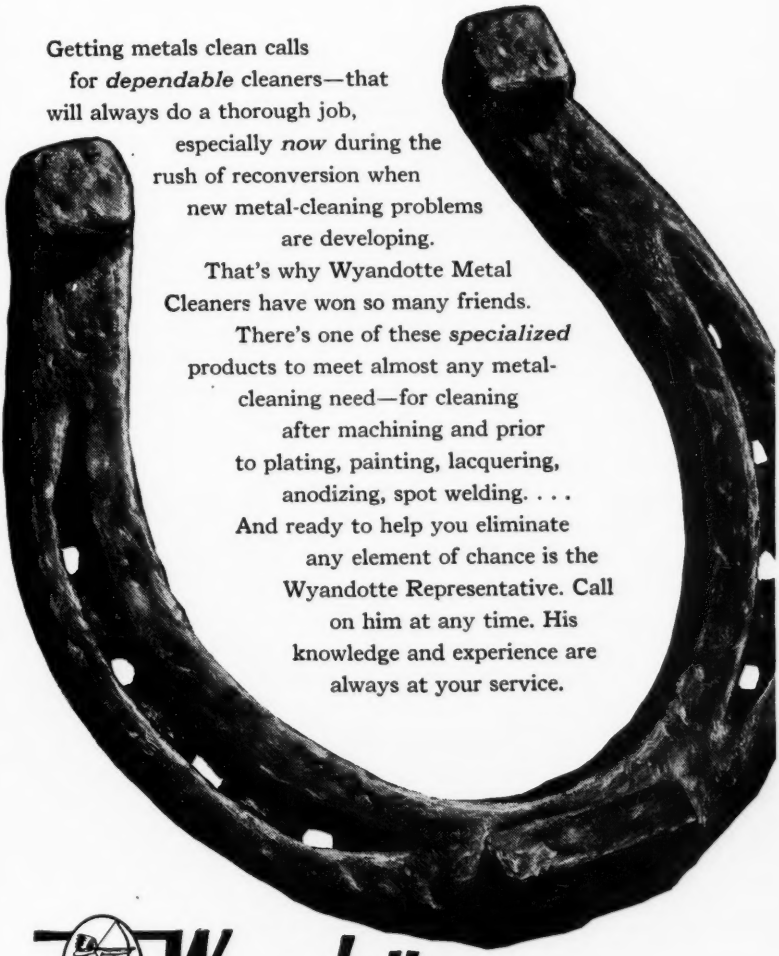
The work is conveyed from one tank to another by means of a dependable air-operated hoist. The work is first immersed in Turco Type X, a powerful alkaline cleaning material, which efficiently removes oil, grease, and dirt. The two Type X tanks are maintained at a temperature of 190 degrees F. After immersion in Type X, the work is rinsed in clean water maintained at a minimum temperature of 200 degrees F. A 6 per cent solution of sulphuric acid, maintained at 140 degrees F., is used as a pickle. Two tanks are provided for this purpose.

Following pickling, the work is hot water rinsed, then cold water rinsed before entering the nickel solution. In this tank, a molecular film of nickel is deposited on the metal to ensure sound adhesion of the porce-



The hot tanks are fired and exhausted from the same end by 10-inch U-tubes. A heat transfer efficiency of 75 per cent has been obtained.

Don't trust to luck in cleaning



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lain enamel coating. The work is then cold water rinsed, neutralized in an alkaline solution, and dried in a hot air blast.

The work is scheduled so that at capacity production 15,000 pounds of metal can be processed every 20 minutes, or 16 tons per day. This very considerable tonnage of metal is cleaned in a room 125 feet long by 20 feet wide. It is clear that the scientific planning of the pickle room pays dividends in maximum utilization of available space, increased production, and in work which is uniformly clean and ready to receive a durable, strongly adherent porcelain enamel coating.

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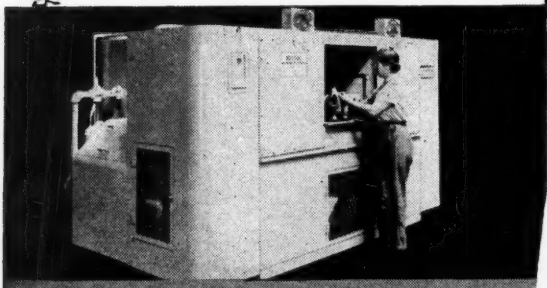

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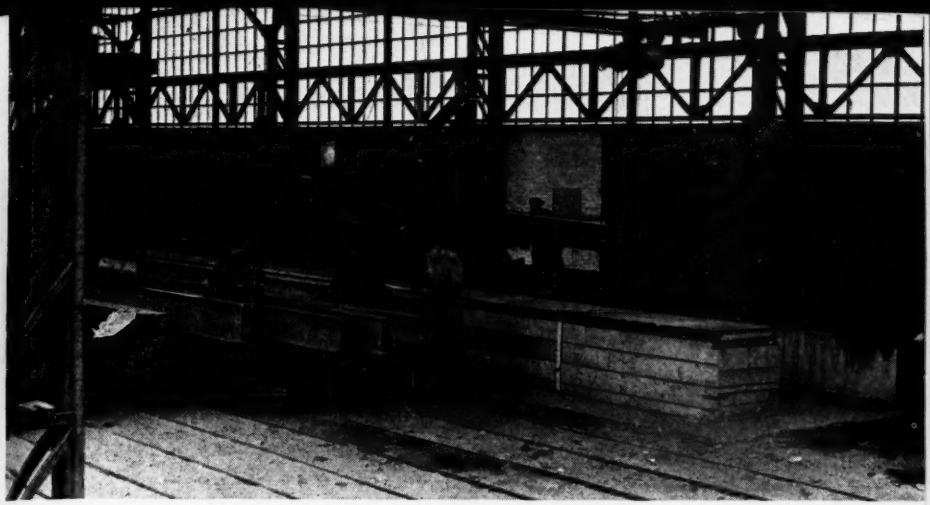
Salvaging War Damaged Metal Beams

War damaged metal beams as they arrive at the plant of Messrs. Du Croo & Brauns for salvaging

(The descriptive matter and photographs herewith were provided by A. Thomassen, agent for the American Chemical Paint Company, Ambler, Pennsylvania.)

THIS article illustrates and briefly describes how at the plant of Messrs. Du Croo & Brauns at Amsterdam, Holland, heavy metal beams and other structural iron and steel, found in the bombarded city of Rotterdam, are being salvaged and put back into service. Most of the beams are of a size Din. 30 to 36 and N.P. 24 to 40. However, some Din.-beams 70 at variable lengths up to 13 meters are also handled.

View of department in which the bent metal beams are accurately straightened to the millimeter on hydraulic machines

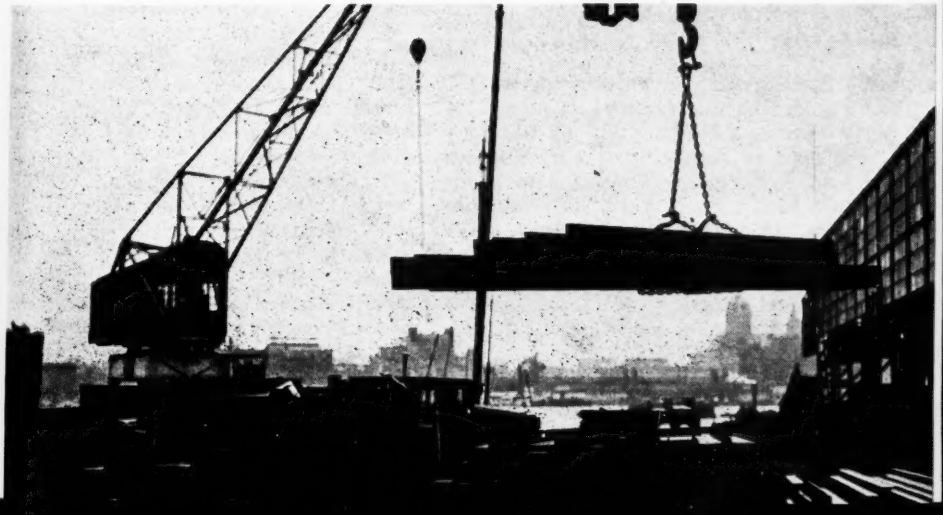


Pickling, rinsing, and Deoxylyte baths in which the metal beams are prepared for subsequent painting with red lead

After accurately straightening to the millimeter on hydraulic machines, the beams are pickled in tanks 14 meters long x 1 meter wide x 0.8 meter deep. The pickling bath consists of a solution of muriatic acid diluted 1 to 1 volume by volume with 1 per cent of Rodine 60 to the muriatic acid of commercial quality. To this is added 5 per cent by volume of nitric acid of 36 deg. Be. The pickling bath is used at the same temperature as the room.

After pickling and then rinsing in cold water, the beams are subsequently immersed for 5 minutes in a solution of 2 per cent by volume of Deoxylyte No. 7 having a temperature of 85 deg. Centigrade. Following this, the beams are allowed to thoroughly dry and then painted with red lead, thereby making them again readily suitable for use in building construction.

Salvaged metal beams ready for shipment to areas for reuse in building construction



LEAD Coatings

By DR. F. R. MORRAL
American Cyanamid Company
Stamford, Connecticut

SINCE Pearl Harbor, lead has taken a predominant place in the field of protective coatings. Lead coatings have been used for many years on account of their own merits (1-11,40). During the war, however, lead had been advocated as a substitute for zinc (12, 13). Now that the war is over, no doubt, each metal used as a coating will find its way back to its natural place, which will depend on economics, availability, and properties.

An early patent on "mode of covering iron surfaces of metal with lead" was granted to O. Eberling in 1888 (14), while in 1885 H. Egalls obtained his on "the process of contructing lead vessels" (15). Many patents have been applied for since (16).

Lead plating inside of underweight shells was used in the last war (17). At present, lead plating on bearings is used in aeronautics (38). Hot dip lead coatings are employed in gasoline tanks, barrels (9, 38), fencing, wire (13), farm equipment, nails (18), air conditioning equipment, and the sheating of cable (19). In the chemical industry (40), lead is often used as a lining for iron tanks, vats, and so on.

Various processes are used for coating with lead, and they may be listed as follows:

1. Hot dipping (5, 19-22, 38, 39).
2. Electroplating: (23-27, 38) (a) in aqueous solution.
   - I. lead fluoborate
   - II. lead fluosilicate
   - III. lead sulfamate
   - IV. Others: lead benzene disulfonic acid solution, nitrate, acetate perchlorate, oxalate, dithionate, alkaline plumbites. and cyanides
   - (b) from fused salts
3. Spraying (20)
4. Fusion (28-33)
   - (a) hydrogen rich flame
   - (b) oxyacetylene flame
5. Vaporization (34)

For the successful application of a lead coating to a metal, three essential steps are necessary, and frequently a fourth one is used (35).

These are:

1. Cleaning and descaling of the metal to be coated.

2. Activation of the surface of the metal to be coated. This is accomplished by either using a flux or an intermediate alloy or metal to ensure proper bonding.

3. Actual lead coating process, by

one of the methods indicated above.

4. Finish of the coating.

Lead hot dipping steel has presented many difficulties (36-37). Considerable work has been done recently in the development of proper fluxes (5). Lead low in tin and/or in antimony alloys are used which make the process successful. Previously, the problem had been attacked with the purpose of introducing an intermediate metal or alloy (1) to serve as a bonding agent. This same principle had been used in the application of fused lead coatings (31).

Aside from the interest of lead coatings in the chemical industry (40) because of their corrosion resistance, the interest has been lately in the resistance of lead to atmospheric corrosion and to water (2-10). Recently, an electron beam diffraction study (10) has been applied to the study of the surface films formed on lead in contact with water.

The forming of lead coated sheet steel and strip (5, 11, 16) has been of interest for some time and particularly for some of the new applications (38).

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Glycerin—Its Industrial and Commercial Applications. By Georgia Leffingwell and M. A. Lesser. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 302 pages. Cloth binding, board covers. Price, $5.00.

This book comprises a comprehensive survey of the large number of industrial products which contain glycerin in smaller or larger percentages. Each chapter covers the use of glycerin in a particular branch of industry and contains a discussion of the properties of glycerin which render it useful for the industry covered in the chapter.

The general discussion is followed by a wealth of formulas carefully selected by the authors' many years of experience in the preparation of glycerin-containing industrial products. Attention is called to the distinctive qualities of the various formulas and the uses to which they are applied. An extensive bibliography is provided for those who wish to acquire more detailed information about the methods and formulas listed in the book.

The contents of the book range as follows: History of Glycerin; Adhesives and Cements; Cleaners and Polishes; Electrical Equipment; Explosives; Leather; Lubricants; Metals; Packaging Materials; Paper; Photography; Plastics; Printing and Lithography; Protective Coatings, Insulating Paints, Etc.; Rubber; Textiles and Dyes; Tobacco; Glass; Agriculture; Cosmetics; Beverages; Foods; Medical and Surgical; Oral and Dental; Pharmaceuticals; Veterinary Medicine; Optometry; Glycerin Derivatives; Listing of Glycerin Uses; Appendix; Tables; and Index.

ACID CLEANING AND DESCALING COMPOUND . . .

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2 VITAL USES

1. As a pickling bath concentrate in metal finishing shops.
2. As an acid cleaner for removing water scales from feed lines, boilers and a variety of industrial equipment.

4 MAJOR ADVANTAGES:

1. METAL SURFACE PROTECTION: This carefully manufactured compound is known to give high protection to ferrous metal surfaces. The danger of over-pickling, pitting and high hydrogen absorption will be minimized.

2. REDUCES ACID CONSUMPTION: Compared to an uninhibited acid, Pennsalt PM-90 reduces acid consumption since the acid cleaner is consumed principally in the removal of rust and scale and not in attacking the base metal.

3. IMPROVED WORKING CONDITIONS: Acid fuming is controlled, thus contributing to better working conditions in the plant.

4. CONVENIENCE: Furnished in liquid form . . . can be used either directly from the original container or diluted as much as one part Pennsalt PM-90 to four parts of water. The dilution range will be governed by the speed of cleaning necessary as well as requirements of the particular operation.

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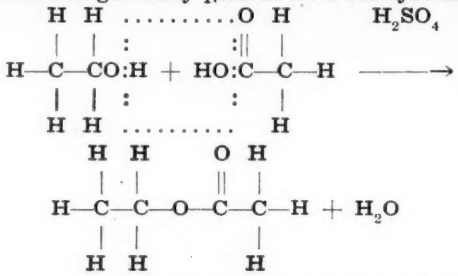
Organic Chemistry

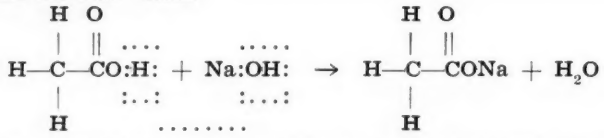
By C. B. F. Young, Ph.D.

Part 6

CARBOXYL acids react with alcohols to produce materials called esters. This group is very important from the commercial angle and is found in many natural products. A good example of the formation of esters is to allow ethyl alcohol to react with acetic acid as shown below. Sulphuric acid is generally present as a catalyst and to absorb water.



The higher the temperature, the faster the reaction will be. Above, it will be noted that the H is furnished by the alcohol while the OH is furnished by the acid. This being the case, the formation of esters by alcohols and acids is by no means a neutralization. In the latter, the acid furnishes the H group and the base the OH. Thus:



Therefore, neutralization is different from esterification. Esters may be considered a mixture of anhydrides of an alcohol and an acid.

An interesting fact concerning esters is that many of the materials formed from the lower open chain acids and lower alcohols are sweet smelling liquids used as artificial flavoring materials and as solvents for the lacquer industry. The esters of long chain acids and long chain alcohols are the important constituents of waxes. Fats are esters of fatty acids and one specific alcohol,

glycerol. This alcohol contains three hydroxy groups and reacts with three molecules of acid.

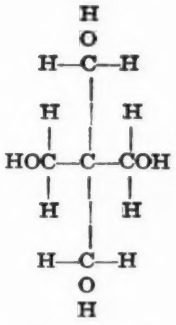
In regard to the flavoring, methyl butyrate smells like pineapples and is sold as an artificial flavoring, while isoamyl acetate and isoamyl isovalerate have flavors like pears and apples respectively. The odor of oranges is given by the ester, octyl acetate. Ordinary amyl acetate smells like bananas. There are a number of others, however, but the above illustrates the point.

In the synthetic plastic and coating industry, a number of synthetic esters have become important in the last few years. For instance, in the paint and varnish field, esters of glycerine, glycol, pentaerythritol, and so on, have been combined with rosin, fatty acids, and similar materials, such as tall oil, to produce materials having improved qualities over some natural esters which have been used for centuries. A good example would be to make a pentaerythritol ester of tall oil and use it as a substitute for linseed oil. These materials have been finding use as a component in core oils of late. Incidentally, tall oil is a material recovered from the sulphate pulp plants using slash, lob lolly, and long leaf pine. It is on the market today in the acid form and contains about 50 per cent fatty acids such as oleic, 40 per cent rosin acids such as abietic, and 8.5 per cent higher alcohols such as phytosterol. This material was discussed in a previous chapter. In the plastic field, esters of glycerine, pentaerythritol, and so on, with maleic anhydride, phthalic anhydride, and so on, have found application. The war has kindered this use due to the fact that the components had to be taken for other fields. However, as soon as restrictions have been lifted, the materials will go back into these channels.

It has been found (1) that pentaerythritol esters are superior in paint, varnish and enamel films to glycerol esters with regard to:

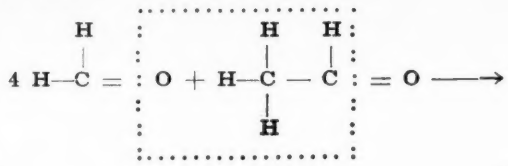
1. Drying Time
2. Gloss
3. Flexibility
4. Hardness
5. Toughness
6. Durability
7. Yellowing

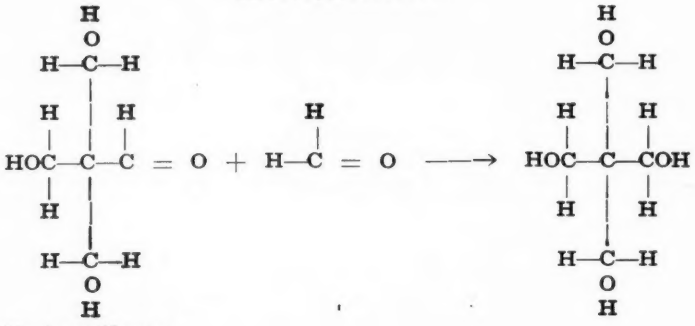
There are several pentaerythritols used to make esters and a short description will be given here. Pentaerythritol is tetramethylolmethane and has the following formula:



(1) Tech. Data. Heyden Chem. Co., New York, N. Y. Pentaerythritol Drying Oils. Page 1.

It can be made by the alkaline condensation of formaldehyde and acetaldehyde as shown below:





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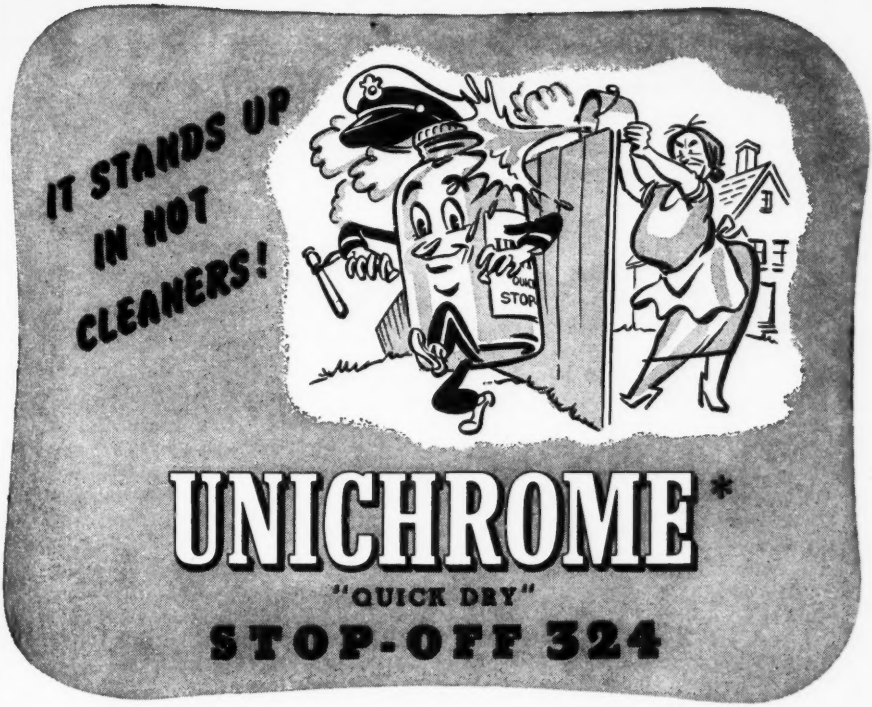

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PROPERTIES

Chemical Resistance—Excellent in all plating cycles.

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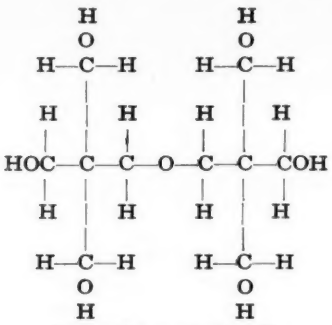
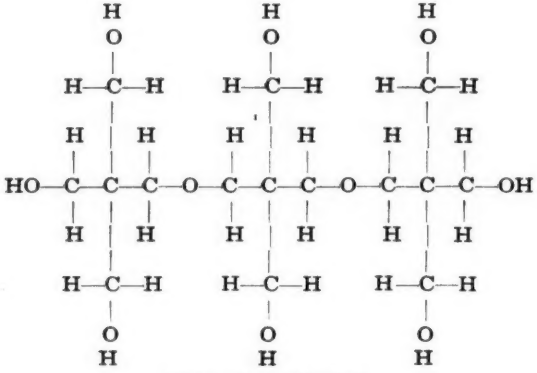
There is also a dipentaerythritol and a tripentaerythritol. The formulas are given below:



Dipenthaerythritol H



Tripentaerythritol

These materials are combined industrially with the following materials to produce esters: maleic and phthalic anhydrides, succinic acid, adipic acid, sebacic acid, rosin or abietic acid, linseed oil fatty acids, soy oil fatty acids, stearic acid, oleic acid, and tall oil.

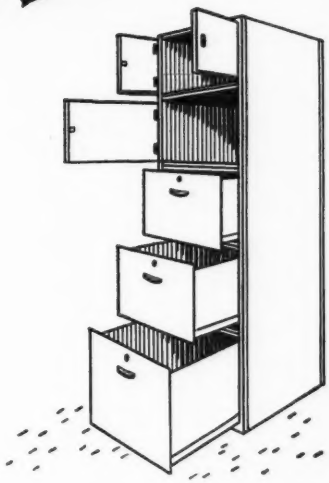
Catalysts are used in esterifying and the following have proved satisfactory: sulphuric acid, sodium acid sulphate, acetic acid, calcium oxide, calcium naphthenate, calcium stearate, and calcium rosinate. The reactions are carried out in an atmosphere of nitrogen or carbon dioxide or a partial vacuum at temperatures of 180 to 225 deg. Centigrade.

Waxes are an important field and deserve mention here. Above, it was stated that they were esters of long chain acids and alcohols. Spermaceti, obtained from the sperm whale, is a crystalline wax containing as an important ingredient cetyl palmitate:

$$CH_3(CH_2)_{14}\overset{\overset{O}{\|}}{C}O(CH_2)_{15}CH_3$$

USERS TELL US WE'VE DEVELOPED A

Better Finish for Frozen Food Lockers



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A gleaming white finish that retains its original color practically indefinitely . . . Easily kept clean and sanitary . . . Unaffected by fats and greases . . . Highly resistant to rust and long exposure to moisture . . . Hard and scratchproof, yet tough and flexible even after continuous service in sub-freezing temperatures.

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This is composed of palmitic acid and cetyl alcohol. Beeswax, another important wax, contains myricyl palmitate which has the formula:

$$C_{15}H_{31}\overset{\overset{O}{\|}}{C}OC_{30}H_{61}$$

At this point, a discussion of fats is in order because of their importance in the field of metal finishing. These materials are used as lubricants in working metals; for instance, as components in cutting, drawing, and stamping compounds, as well as ingredients in anti-rusting materials. The result is that fats are on most metals after they have been fabricated and must be removed before the materials can be plated or lacquered. Fats can be removed in water solution by rendering the product soluble in water or by emulsifying it.

When metal surfaces are to be treated after fabrication, namely, electroplated or coated with phosphate, lacquer, paint, varnish, vitreous enamel, and so on, it is necessary that the metal surfaces be cleaned, in many cases chemically, otherwise the deposits of metals or the coats of paint, lacquer, varnish, and so on, will not adhere or will be porous, thereby aiding corrosion of the base metal and producing a poor appearance. In the plating industry, about 35 per cent of all finishing troubles are due to poor cleaning. In the other industries, a considerable percentage can also be traced to this factor. From the above, one can readily see that the cleaning of metallic surfaces is an important factor.

In order for a surface to be clean, all dirt must be removed. Dirt may be defined as "matter misplaced." Thus, on a piece of steel, any material which is not steel is dirt. This may be oil, grease, rust, fire scale, and so on.

Dirt may be classified as follows:

1. Saponifiable oil and grease
   - A. Hard (stearic acid)
   - B. Medium (vegetable wax)
   - C. Soft (tallow)
2. Non-saponifiable oil and grease (mineral oil)
3. Rust and scale
   - A. Hydrated ferric oxide (brown rust)
   - B. Anhydrous ferric oxide (blue scale)
   - C. Magnetic oxide (black scale)
4. Mixture of above

   Materials remaining after buffing (oil and grease on a rusty or scaly surface).

Numbers 1 and 2 may be classified as organic. Number 3 is inorganic, while No. 4 is a mixture of both.

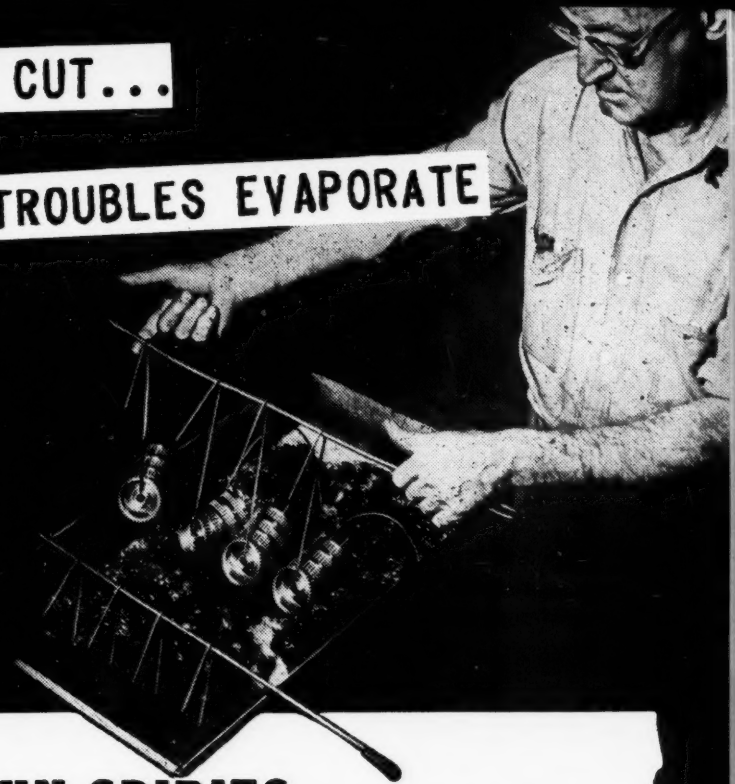
1. Removal of Saponifiable Materials

Any material which will unite with an alkali, sodium hydroxide for example, and forms a soap may be classified as a saponifiable product. A good example is stearic acid. Thus, we have

$$\underset{\text{Stearic acid}}{CH_3(CH_2)_{16}COOH} + NaOH = \underset{\text{Sodium stearate}}{CH_3(CH_2)_{16}COONa} + H_2O$$

COSTS CUT...

DRYING-TROUBLES EVAPORATE



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From the above it can be seen that an organic acid units and neutralizes a base, producing an organic salt and water. In this case, the salt is sodium stearate which is soluble in water. This salt is also a soap. Thus, the insoluble stearic acid is converted into a soap which is soluble in water.

The rate of reaction of the above equation is rather slow. The temperature can be raised in order to hasten it. Therefore, it is generally customary to use saponification cleaning solutions near the boiling point. If a solution is agitated, it will work faster also. Hence, some type of stirring is generally utilized.

Saponifiable cleaners generally contain:

(1) Free alkali
(2) Salts of weak acids
(3) Soaps
(4) Suspended matter

A good foundation formula is as follows:

NaOH	4 oz. per gal.	30 grams per liter
Na_2CO_3	2 oz. per gal.	30 grams per liter

In the above, the free alkali furnishes the base which units with the saponifiable material. The salts of weak acids act as a buffer in maintaining the correct pH. Soaps, if present, help to dissolve some of the organic material as colloidal particles, thereby aiding the removal of dirt. Suspended matter gives rise to a scrubbing which scours off the dirt from the surface. Examples of the above are (1) NaOH, (2) Na_2CO_3, (3) sodium stearate, and (4) ortho and meta silicates.

The composition and concentration of the various materials in a cleaner depend upon the metal or alloy being cleaned and the foreign matter present. Thus, two entirely different cleaners are used for cleaning iron and zinc. The important factor to watch here is the etching of the surface. This generally is a function of the pH. The hydroxyl ion concentration should be as high as possible so as to reduce the interfacial tension between the organic compound and the cleaning solution, which produces rapid emulsion. However, there is a limit to pH. This is shown for some metals below:

Metal or Alloy	pH at Which Etching Occurs
Zinc	10
Aluminum	10
Tin	11
Brass	11.5
Silicon	13
Steel	—

Ordinary soap solutions have a pH of 9.5-10. This can be used many times to clean zinc and aluminum. The soaps used should be a soluble free rinsing type which is made from sulphonated oil or low titre stock. The titre of a soap is that temperature in degrees Centigrade at which the fatty acids used in making the soap will crystallize or solidify.

Many times, the agitation is accomplished by a unique method. This consists of making the work either the anode or cathode in a suitable solution and passing a current through the bath. It will be recalled that H_2 is released at the cathode while O_2 is liberated at the anode. Thus, the work, being cathode, is subjected to a reducing atmosphere and, at the same time, a scrubbing action is provided by the liberated gas. Metallic oxides will be removed by chemical

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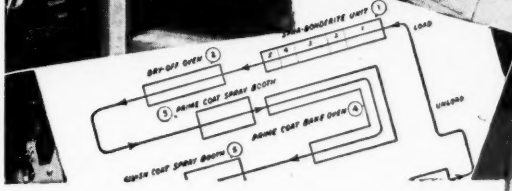

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as well as a physical action. If the work is made the anode, oxygen will be liberated, which will also aid in removing the scale. However, at this electrode, oxidation takes place and, for this reason, the metal will have a tendency to go into solution. Therefore, one must be careful not to allow such a condition to exist too long or a severe etching will occur, provided the metal is soluble in the solution. However, this is advantageous in some solutions. Any solder which might be present can dissolve chemically. This, in turn, will be redeposited over the entire surface as a very thin film which will prevent adhesion of the plate. If the material being cleaned is now made the anode, the solder or its components dissolve once more and leave the base metal.

Concerning cleaning, it will pay one many times to investigate the type of oil used for lubricating the dies for forming the metal. For instance, it may be quite possible to change the lubricating oil so that the metal may be cleaned easier than before. In this way, money can be saved. Also, by using the cleaner to the best advantage, it is possible to cut down the cost of cleaning.

There are two methods which deserve mentioning here. These are, (1) the two tank interchange system and (2) the regenerative method. In the first, the cleaning tank is divided into two equal compartments, A and B. The dirty work is put into A where most of the dirt is removed, and the object is then placed in B. Soon A gets dirty, is dumped, and a new solution is made up. The dirty work is now placed first in B and then in A, and the cycle continues.

The second, or regenerative, method also involves a two compartment tank. Each section has a hopper containing a trip attached to the bottom so that insoluble materials which settle out can be removed. The first section is used for all cleaning until the solution becomes dirty. Then, the second section is used while the first is allowed to stand. After standing, the materials which settle out are removed via the hopper, and any floating dirt is taken off the top of the solution. After this operation, the first section is again ready for use while the second section can be cleaned.

2. Removal of Non-Saponifiable Compounds

Non-saponifiable materials will not react with sodium hydroxide. However, alkali cleaners will remove them to a certain extent by suspending the foreign materials in the solution as an emulsion. This is especially true if a soap is present. It is a well known fact that kerosene will not mix with water. However, if some soap is added to the water and then mixed with kerosene, it will be found that the latter material is held quite well in suspension.

3. Removal of Rust and Scale

Rust and scale are removed generally by (1) chemical, (2) electro-chemical, and (3) mechanical abrasion. The first method consists of dissolving the foreign materials in a bath, for instance a sulfuric acid solution. It is generally called pickling. In the case of iron and steel, these coatings consist of three oxides; namely, (a) ferric oxide, hydrated (brown rust which is soluble in dilute pickling acids), (b) ferric oxide (blue scale which is partially soluble in pickling acids), and (c) magnetic oxide (slightly soluble in pickling acids).

(b) and (c) occur on pieces which have been heat treated. Therefore, most of the rust or scale on steel products which must be removed consists mainly of (b) and (c). It is a well known fact that these materials are removed quite

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easily by pickling acids. The removal is not due to the dissolving action but to the fact that being porous, they allow the bath to penetrate and attack the base metal. This, on going into solution, releases a volume of hydrogen which pries off the oxide coating.

The mineral acids used in pickling are surfuric and hydrochloric. The former is used in concentrations ranging from 2 to 20 per cent, while the latter varies from 5 to 50 per cent. The temperature of these baths is generally around 50 to 80 deg. C. The factors affecting the rate of pickling are:

1. Material to be removed
2. Kind and concentration of the acid
3. Temperature of the bath
4. Fe^{++} concentration
5. Degree of agitation
6. Inhibitors used

Sequence of Cleaning

After pointing out the various methods of cleaning, the next thing of importance is to discuss the logical routine of preparing the metallic surface. Work to be plated will generally contain rust, grease, and so on, and will usually be degreased in order to remove the greater portion of the organic material. Next, the rust can be removed by an acid or pickle dip and any remaining grease will be removed in an electrocleaner. Generally, an alkaline solution will be used. In almost any case, the final solution will be an alkaline bath. Caution must be observed here as the work coming out of this bath will have a thin alkaline film spread over the entire surface. This must be removed before a satisfactory plate can be applied. This film generally is composed of basic metallic oxides. Precaution must be exercised in removing the film as it is quite possible to precipitate the compounds on the metallic surfaces. Once this happens, trouble is encountered in removing the insoluble precipitates. One of the best solvents for a variety of films is hot water. Thus, a dip or spray with hot water will generally remove the alkaline film. After this, a rinse in cold water is advantageous for aiding in dissolving the film and lowering the metal temperature. In all cases, it has been found that a water spray is superior to a water dip for rinsing parts.

Basic solutions have a tendency to cling to surfaces more so than acid baths. This can be easily demonstrated by putting a few drops of normal NaOH solution between the thumb and forefinger of the left hand and then rubbing the members together. Put a few drops of normal H_2SO_4 between the same fingers of the right hand and again rub. Now place each hand under water. After rinsing, remove and again rub the fingers together. Notice how completely the acid has been removed and how the basic material continues to adhere. From this simple experiment, it can be seen that acid films wash off easier than basic ones.

For this reason, it is generally good practice to employ a dilute acid dip after basic cleaning and rinsing. Any basic film remaining will be neutralized and basic salts will be dissolved. Also, many metallic oxides remaining will be put into solution. After this, another water dip is employed to wash off any acid solution. A cold water solution is generally sufficient for this purpose. In some cases, the work will stain or tarnish upon standing. Then again, there is a possibility of an insoluble metallic oxide film being present which was not

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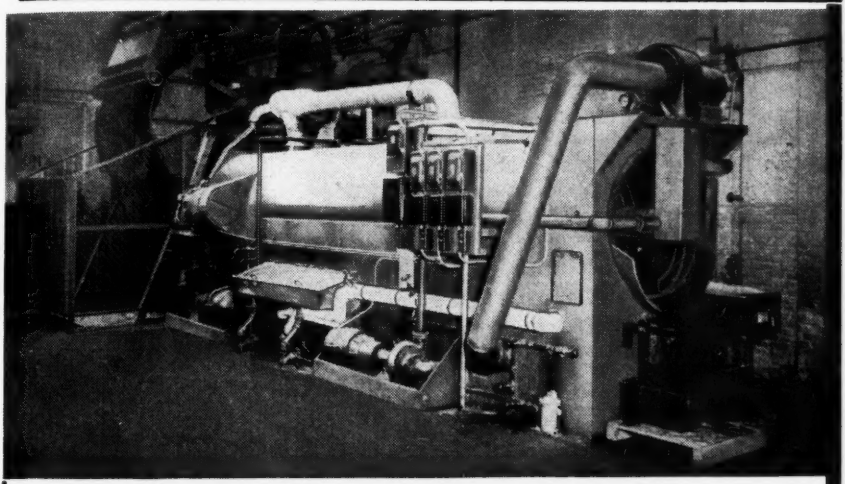

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soluble in the acid dip. In this case, another dip is essential to dissolve the above. A solution used frequently is one containing about 2 oz. per gallon of sodium cyanide. This bath is used quite often to destroy the passivity of nickel coatings.

After the cyanide dip, the work can be rinsed in water. It is now chemically clean and ready for the electrodeposited coatings. It must be kept in mind that the above steps are laid out for general sequence and do not meet all requirements. In some cases, it might be essential that an alkaline soaking precede the electrolytic cleaning or that two acid dips be used. Furthermore, in some cases of plating castings, it is essential that a soaking period of hours be utilized or the work should be "sweated out" in a humid atmosphere for 24 hours. In some instances, it is well to first rinse the work in hot water and then in cold water, repeating this several times so as to cause any solution contained in crevices or cracks of the work to be diluted by the expansion and contraction of these cracks due to the changes in temperature.

Fats are used to manufacture soaps. It should be kept in mind that the word soap covers more than a toilet article. Industrial soaps are very important and have served well in the war effort. Soaps are made for different fields, such as textile, metal cleaning, metal forming, metal degreasing, disinfectant, and other fields. Besides the above, metallic soaps serve as lubricants; for instance, calcium, barium, and lithium soaps. With the above in mind, perhaps a short discussion of the manufacture of soluble soaps would be in order. There are several methods of making this product, however, the old process of saponification with sodium hydroxide and the newer Twitchell

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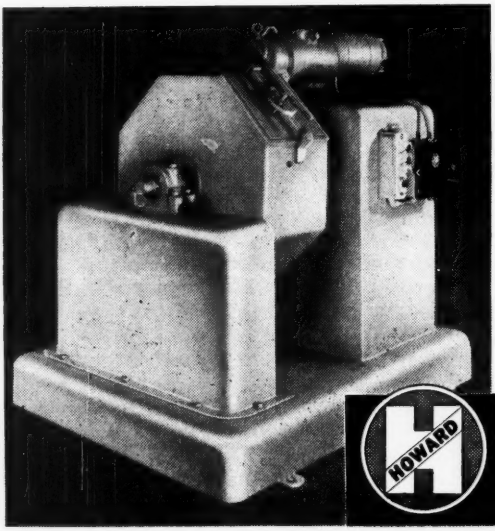

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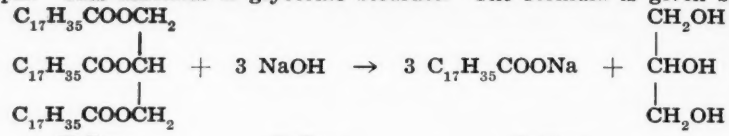
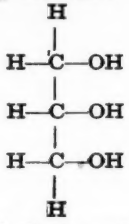
process are the most used. Here only the former will be discussed.

Soap is made primarily from fats which are glyceride. Tallow is a good example. This material is glycerine stearate. The formula is given below:



Tallow (Glyceryl stearate)	Sodium hydroxide	Sodium stearate	Glycerine

This material is first milled and pumped into a large kettle. Along with this is pumped in a small amount of 18 deg. Be sodium hydroxide solution. The whole is agitated by steam. The required amount of alkali is then added. A slight excess is desired. After the above reaction is complete, the substance is allowed to settle and then a saturated brine solution is added. The whole is mixed by boiling with steam. After this, the solution is allowed to settle into two layers. The top one contains the soap and the bottom layer contains crude glycerine. The latter is worked up separately and pure glycerine is obtained. This has the following formula:



The soap is tested for free alkalinity and if 0.2 per cent is not present, an amount of 18 deg. Be NaOH solution is added and the whole boiled. The solution is salted out again. Now other materials are added, such as rosin or oils, which increase the solubility of the soap. Rosin is generally added for laundry soap. The rosin is, in many cases, neutralized separately and added to the soap.

The above description, although sketchy, will afford the student an idea of the function of the saponification process. Space does not permit a similar discussion of the Twitchell process but suffice it to say that the fat is steamed with 1 per cent 60 deg. H_2SO_4 for two hours. The acid, impurities, and water are withdrawn and to the fat is added 1 per cent sulfo-benzene stearic acid ($C_6H_4HSO_3C_{17}H_{36}COO$, Twitchell reagent) and the mixture is steamed for 24 hours. After settling the glycerine, water is drawn off for the glycerine recovery. The fatty acids remaining are boiled with a saponifying agent as desired in a Crutcher or similar machine.

At the present time, there are a number of synthetic esters used in the industry. A very important one is that of the glycerine esters of fatty acids, such as oleic, linoleic, and linolenic. Another family is composed of pentaerythritol and fatty acid esters. These materials are being used in the manufacture of plastics, resin films, and core oil binders. Another important group utilizes sorbitol and manitol fatty acid esters. These are beginning to be of real commercial importance. The formulas for some of these alcohols are given above. The esters can be made from these alcohols by the usual methods.

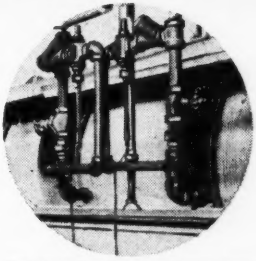
Both heating and cooling of degreaser solvent are made automatic with Sarco VL Vapor Line control and TR-40 cooling control.

Metal Washing TEMPERATURE CONTROLS

When plating and other processes requiring metal washing or cleaning became streamlined and automatic, the need for reliable temperature control became obvious.

On this page, we illustrate four different Sarco controls used for this purpose. Each is positive in action, simple in construction and relatively low in cost.

Many manufacturers of washing and degreasing equipment install Sarco control as part of the machine, but it is easily added on existing equipment.



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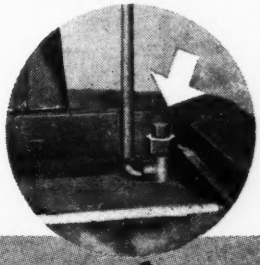

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In order to make the reaction between a fatty acid and an alcohol go to completion, the mass is heated to about 200 deg. C., agitated slowly but completely, and a catalyst added, such as sulphuric acid or sodium acid sulphate, zinc acetate, zinc oxide, calcium oxide, and so on. These materials are very important since they make the reaction go to completion without involving too high a temperature, which produces dark colors that are undesirable.

Below is a list of important esters and their boiling points:

		B.P. °C.
Methyl Formate	$HCOOCH_3$	32.3
Methyl Acetate	CH_3COOCH_3	57.5
Ethyl Acetate	$CH_3COOC_2H_5$	77.0
Butyl Acetate	$CH_3COOC_5H_{11}$	125.0
Amyl Acetate	$CH_3COOC_4H_9$	148.0

Inorganic acids can also form esters. Thus, ethyl sulphuric acid and ethyl carbonate are known. Some typical inorganic esters are given below:

		B.P. °C.
Methyl Sulphuric Acid	CH_3HSO_4	
Dimethyl Sulphate	$(CH_3)_2SO_4$	188.5
Ethyl Nitrate	$C_2H_5NO_3$	87.5
Triethyl Phosphate	$(C_2H_5)_3PO_4$	215.0
Diethyl Sulphate	$(C_2H_5)_2SO_4$	208.0

The author would like to thank Mr. W. Jordan Withrow of The City College, New York, for checking the manuscript.

(To be continued)

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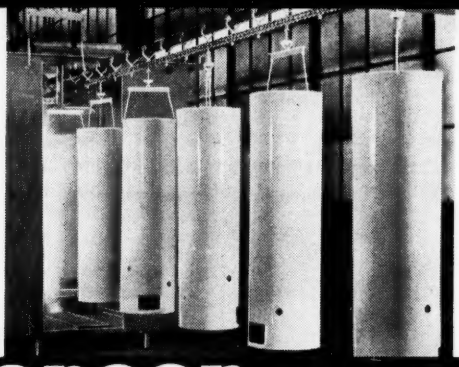

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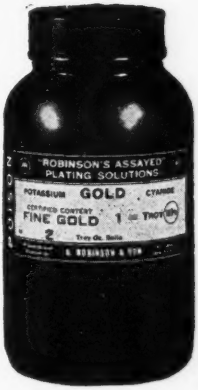

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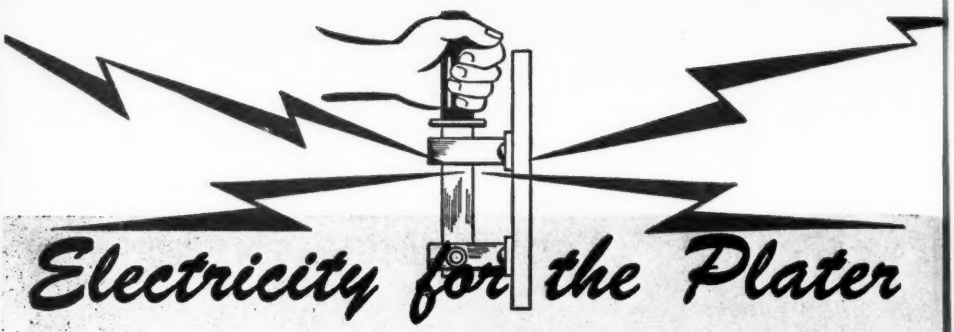


Electricity for the Plater

D. A. COTTON

Part VI

HAVING defined and discussed the basic electrical units—the volt, the ampere, and the watt—we are nearly ready to study the instruments used for measuring them. However, in order to understand the reasons why these meters function, it is first necessary to go a few steps farther along in our study of the basic principles on which they operate.

We have learned that although Oersted discovered that a conductor carrying current caused a compass needle to deflect, it was men like Ampere, Faraday, and Henry who really developed the knowledge which

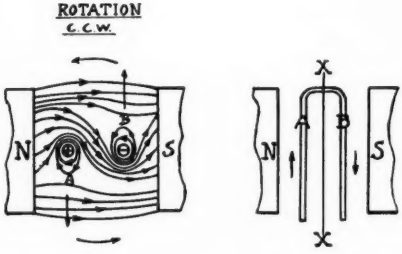


Fig. 25—Field about current-carrying coil between magnet poles

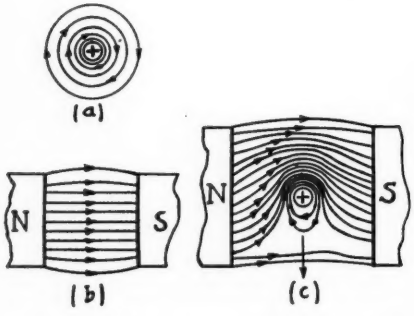


Fig. 24—(a) Field about conductor, (b) field between magnet poles, (c) result of combining (a) with (b)

is the basis of all our modern electrical science. Ampere showed the relation between current flow and the direction of magnetic lines of force about the conductor; also, that a mechanical force is exerted upon a conductor carrying current when placed in a magnetic field.

In 1831, Faraday and Joseph Henry, an American, discovered independently of each other that a current is produced in a conductor if it is moved mechanically across a magnetic field. Referring to Fig. 24, we

will consider some of the flux relations, which is just another way of

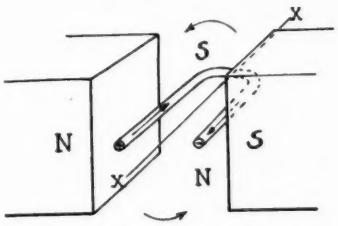


Fig. 25-A—Rotation of coil in magnetic field

saying magnetic field or lines of force.

We have already seen (Fig. 9) that with a current flowing into the end of the conductor, as shown at (a) in Fig. 24, magnetic lines of force encircle the conductor in a clockwise direction. At (b) in Fig. 24 are shown flux lines of a magnetic field between a north and a south pole of a magnet. Now, if we put the conductor shown at (a) into the field shown at (b), we get something like that shown at (c).

Underneath the conductor, the lines of force traveling to the left are directly opposed to the lines passing to the right from the north pole to the south pole of the magnet. These lines tend to neutralize or deflect each other, thus producing a weak field beneath the conductor and dense, crowded field above it. Then, using Faraday's convention of considering lines of force as acting similarly to rubber bands, obviously the conductor will be forced downward. If the direction of the current in the conductor is reversed, the movement would be upward. This is sometimes called the "motor rule" and is the basic cause of measuring instruments indicating and of electric motors running.

To go one step farther, if instead of a single conductor, we place a coil of wire in this magnetic field, we have the conditions shown in Fig. 25. Conductor **A** receives a downward pull and **B** an upward .push, which results in a rotation of the coil in a counterclockwise direction about its axis **X**. If we go still a step farther and realize that a coil carrying current is itself a magnet, the cause for its rotation is even more easily understood than by the explanation given in Fig. 25.

For an explanation of this let us examine Fig. 26. Assume with a coil of wire of only three turns, as shown at **A**, that a current flows through the coil in a clockwise direction as viewed from above. At **B** assume we have taken a cross-section of the coil. Then, in the conductors at the left, the current is flowing away from the observer as indicated by the plus sign and in the conductors at the right the current is flowing out toward the observer as shown by the minus sign.

The lines of magnetic force are flowing around the **A** conductors in a clockwise direction and around the **B** conductors in a counterclockwise direction. Since the flux lines between conductors on the same side of the coil are tending to neutralize each other, we have the effect of lines of force flowing down through the in-

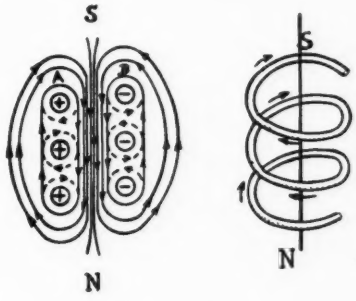


Fig. 26—Magnetic field around coil carrying current

side of the coil and back upward on the outside.

Fig. 27—Rule for finding polarity of coil

In our study of the magnet, we have seen (Fig. 6) that the magnetic lines flow through the magnet from the south pole to the north pole, emerge at N, divide, and flow through the air back to the other end, entering at S. Thus, we see that a coil of wire with current flowing through it becomes a magnet.

When current flows in a clockwise direction through the turns of a coil, as observed from above the south pole is at the upper end (see Fig. 27). Using the right hand as we did in Fig. 10, if we grasp a coil so that the fingers point in the direction the current is flowing through the wires, the extended thumb points in the direction of the north pole.

Now returning to Fig. 25, but simplifying it, we have the conditions shown in Fig. 25-A. Here the current is flowing in a clockwise direction as viewed from above, therefore, there is a south pole above the coil and a north pole below. Since a north pole attracts a south pole but repels another north pole, and vice versa, the coil will tend to rotate in a counterclockwise direction as shown previously in Fig. 25.

It is these magnetic phenomena that are utilized not only to actuate the most delicate measuring instruments but also to turn the armatures of mighty electric motors exerting thousands of horsepower energy. At a later time the applications of the "generator rule" will be discussed, but now we will turn to a consideration of electrical measuring instruments.

The simplest form of instrument for measuring the amount of current flowing in a circuit is the galvanometer. There are two general types of construction used in galvanometers:

(1) A magnetized needle is placed in the magnetic field of a fixed coil energized by the current flowing in the circuit.

(2) A movable coil energized by current from the circuit is placed in the field of a fixed permanent magnet.

Since nearly all direct current switchboard electric meters are constructed on the principle of the second type, we will first consider the d'Arsonval galvanometer, which exemplifies this type. A galvanometer really measures current because it is

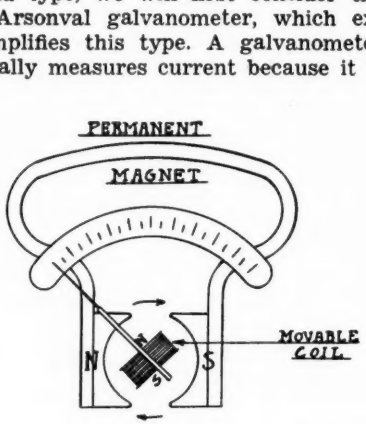


Fig. 28—Elements of d'Arsonval galvanometer

current flowing through its movable coil that causes it to deflect, and the amount of deflection is proportional to the amount of current flowing.

The d'Arsonval galvanometer consists essentially of a stationary strong permanent magnet in whose field is mounted a movable coil very delicately balanced in jewel bearings. The coil is made of very fine insulated wire wound upon a light rectangular frame of thin sheet copper or aluminum. Each end of the coil is connected to a flat spiral spring which not only tends to control the deflection of the coil, but also serves to lead the current into and out of the coil (see Figs. 28 and 29). A soft-iron core is sometimes mounted inside the movable coil which helps to make the magnetic field uniform and produces deflections which are proportional to the current. In other words, the scale is uniform throughout the entire range of deflection.

A voltmeter is merely a galvanometer with very high resistance mounted in series with the movable coil winding (see (a) in Fig. 29). Since the current passing through the meter is proportional to the voltage impressed on its terminals, it will indicate voltage when calibrated with the proper scale. In the voltmeter, all the current going through the meter passes through the movable coil. In the ammeter, only a small part of the current passing

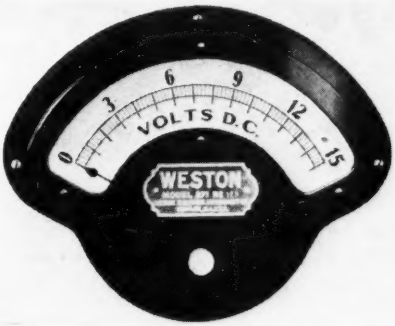


Fig. 30—Weston switchboard voltmeter

through the meter flows through the movable coil (see (b) in Fig. 29).

The ammeter is really a shunted galvanometer. A diagrammatic sketch of an ammeter is shown at (b) in Fig. 29. A shunt S, which is made up of strips of a special resistance alloy having low temperature coefficient and low thermoelectric characteristics, is wired in series with the electric circuit so that all the current passes through it except the very small amount that flows through the coil of the instrument.

Without the shunt, the meter is merely a millivoltmeter, which means that it indicates thousandths of volts. These millivoltmeters are standardized to read full scale when 50 millivolts or 0.050 volt is impressed on their terminals. The shunts are also so designed that when their rated current flows through them, the voltage drop across them is 50 millivolts. Up to ranges as high as 75 amperes, the switchboard ammeters may have these shunts inside

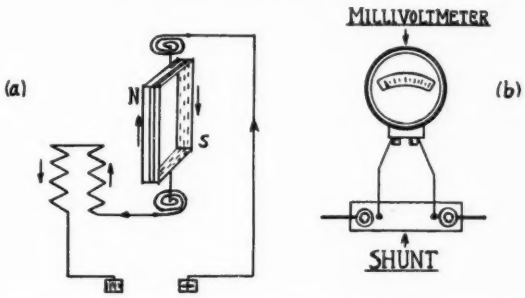


Fig. 29—(a) Electric circuit of voltmeter, (b) elements of d.c. ammeter

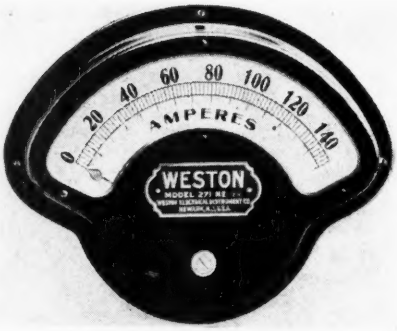


Fig. 31—Weston switchboard ammeter

the meter, but for ranges above that the shunt is mounted externally and connected to the millivoltmeter by means of flexible leads, normally eight feet long for Weston meters. It is very essestial for accuracy that the meter, leads, and shunt that belong together should never be interchanged or altered.

Figures 30, 31, and 32 are illustrations respectively of a switchboard voltmeter, an ammeter (millivoltmeter), and a shunt furnished through the courtesy of the Weston Electrical Instrument Co., Newark, N. J., maker of the instruments.

The next article in this series will continue the discussion of electric meters.

"Parco Lubrizing," a simple chemical treatment which produces on wearing surfaces, without the use of electric current, a non-metallic oil-absorbent coating that permits rapid break-in of moving parts without scuffing or scoring and reduces subsequent wear, is the subject of a technical bulletin now available free from the Parker Rust Proof Co., 2172 E. Milwaukee Ave., Detroit 11, Michigan.

Corrosion - Resistant Masonry. Prepared by its engineering staff, a 52-page plastic-bound bulletin now being distributed by The U. S. Stoneware Co., Akron 9, Ohio, provides helpful facts and suggestions pertaining to materials and building methods for tanks, towers, sumps, floors, and other masonry construction. Copy of Bulletin 810 is available free to engineers and others interested in corrosionproof masonry addressing requests on their company letterheads.

Oakite-Vapor Cleaning Unit for the quick and easy removal of grease, grit, grime, paint, and other deposits from surfaces is fully covered as to features, equipment specifications, operational data and specifications, and so on, in a six-page illustrated folder published by Oakite Products, Inc., 54C Thames St., New York 6, N. Y. Copy free.

"Chromate Corrosion Inhibitors for Internal Combustion Engines," a 16-page technical bulletin based upon labroatory and field investigations of the Mutual Chemical Company of America, 270 Madison Ave., New York, N. Y., is now being distributed by this firm. The purpose of the bulletin is to show how chromate may be employed to the best advantage in various engine-cooling systems.

Data included show chromate consumption per thousand square feet of ferrous surface for various periods of time, and the effects of chloride concentrations. Graphs and examples of practical assistance to the engineer are also provided in the bulletin, copy of which is available free upon request.

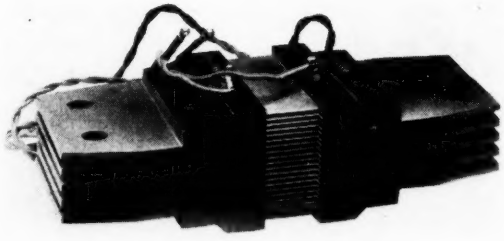
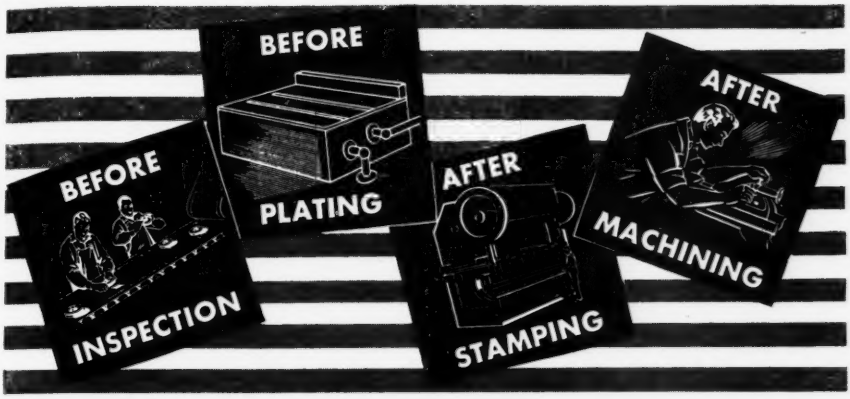


Fig. 32—Five-thousand ampere shunt



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The Use of Ultra Sound in Metal Coating

By CHARLES DELMAR TOWNSEND
Process Engineer

RESEARCH work has been carried on in the use of ultra sound frequencies to coat metal parts. Experiments indicate the possibilities and outline one particular example of this use of high frequency electrical energy. Tests have been made successfully in the molten tinning of aluminum sheet.

It is recalled that the surface oxides on aluminum make it practically impossible to apply any type of metal coating. Dip tinning and attempts at soldering have not been successful to any great extent. However, under the recently developed process, aluminum can be coated with tin and the bonding of this coating is not separated by the oxide.

The process consists of dipping the aluminum into a molten bath of tin and at the same time applying ultra sound waves to the aluminum and tin alternately. The rapid vibrations cause the oxides on the surface to be removed and replaced by a layer of tin which alloys with the surface of the aluminum.

The frequency of ultra sound waves is 300,000 vibrations per second, causing metal particles to obtain a velocity of 15.6 inches per second with an amplitude of about 0.000039 inch. Since the resultant acceleration is 10,000 times the acceleration due to gravity, this, no doubt, accounts for the removal of the oxide film from the aluminum. The tin particles will hammer the surface and thus actually remove the film by this bombardment.

The wave lengths of ultra sound approach those of visible light waves, and in liquids the velocity of sound is 3,900 feet per second with wave lengths from 2.3 to 0.00008 inch. Due to this fact, very high pressure gradients of about 382 pounds per inch are set up and impart enormous accelerations to particles in the liquid medium. In solids, this acceleration may cause complete disintegration of the mass. However, if controlled, it can be used to improve the structure of cast materials.

The possibilities of the use of ultra sound waves for metal coating have not been explored to any extent. The process is impressive but further tests must be made to prove it is completely practical. There are many uses where this process might be employed to a great advantage.

Aluminum and many of its alloys have long been recognized in the electrical field but the difficulty encountered in soldering has hindered its use in many instances.

With this recent development, the tinned sheet of aluminum can be used for lugs in many electrical connections. In addition, many parts now made from brass, bronze, and nickel silver could be replaced by tinned aluminum sheet. By the use of this material, practically no flux would be required for soldering and this, it is believed, would overcome many dif-

ficulties that are now encountered.

Carrying the use of ultra sound a little further, it might be possible to apply aluminum coating to steel by this method, thereby opening many new uses for such a metal combination. Ultra sound waves and their use in the metal-coating industry are now established, and it remains for our engineers to develop their further use. The use of high frequency electrical energy and sound waves should help in the improvement of the present methods used in metal coating.

Wilkens - Anderson Dead Stop End Point Titrator for moisture determinations in minutes using Karl Fischer Reagent and for measurement of organic compounds and oxidation reduction titrations is the subject of a four-page illustrated folder released by the Wilkens-Anderson Co., 111 N. Canal St., Chicago. Ill. Copy free upon request.

Wiley Books on Chemistry. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., has prepared a 24-page booklet providing condensed information on the various books on chemistry now available from this firm. Listed are books on chemistry, colloid chemistry, electrochemistry, inorganic and organic chemistry, physical chemistry, physiological chemistry, and biochemistry. Copy free upon request.

"The Sol-Speedi-Dri Alphabet," a six-page folder issued by the Waverly Petroleum Products Co., Drexel Bldg., Philadelphia 6, Pa., suggests almost 100 ways in which to prevent employee injury, decrease fire hazards, preserve equipment, and perform a number of other vital economy-safety functions in and about machine shops, industrial plants, warehouses, storerooms, and so on, through the use of Sol-Speedi-Dri—an all-purpose industrial housekeeping aid, cleaner, and absorbent which is said to thoroughly absorb soluble and insoluble liquids of all kinds, including oils, greases, acids, paints, chemicals, water, and so on. Copy free upon request.

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Dipping and Spraying Electrostatically Present Definite Advantages

IT appears that the economics of electrostatic dipping and spraying have been so well established by war production experience that they have earned a permanent place in the field of industrial finishing. In general, the electrostatic process provides for maximum uniformity of finish with substantial savings in material. The field of industrial finishing is becoming so complex with the advent of new coating materials and new or improved coating methods that the paint manufacturer, the user, and in many cases the oven manufacturer must each be fully cognizant of the others' abilities and methods. Electrostatic "detearing" and electrostatic spraying are two methods of applying finishing materials which were discussed by Dr. Harold Ransburg before the Cleveland, Ohio, Electrochemical Society symposium on "Modern Metal Protection" ("Steel," October 15, 1945). The processes are successfully being used in several fields and hold promise of wide application.

In the operation of the electrostatic process, the article to be coated is passed through an electric field created by 85,000 to 100,000 volts of pulsating d.c. at 10 milliamperes or less. The electrodes are fine wires of small surface area in comparison with the article to be coated. With this principle reversed and a heavy grid as the electrode and the voltage reduced to 80 kv., the equipment serves as a detearing device for paint-dipping operations to attract from a dipped piece the "fatty edges" which form at the "drain-off" points. In spraying, fixed guns are used, having special tips developed for the

required pressure operation. In general, the article to be coated is passed on a conveyor line, which grounds it, through the electric field. A charge is imparted to the sprayed particles of the coating, causing them to be attracted to, and deposited on, the article with minimum loss of paint or lacquer.

Electrostatic Detearing

THE many advantages of the dip method of applying liquid coatings are well known to those associated with the field of industrial finishing. Equally well known are the methods, difficulties, and limitations. Probably the most serious limitation encountered in this method has been the ever present accumulation of excess material at the drain-off points. These accumulations and fatty edges not only affect the finish obtainable by this method, but indirectly influence the design of the oven in which they are baked. The bake is necessarily designed to meet the requirements of the heaviest sections of the coats. With alkyd-synthetics and oleoresinous materials, these heavy accumulations can never be properly baked to a satisfactory hardness when they are in the presence of more uniform coatings without overbaking the thinner films. The excess, in most cases, yields a soft, tacky or even wrinkled condition of the finish at that point.

Equally objectionable are the points of excess material when polymerizing types of finishes are used because, in this case, the excessive coating produces a local brittle condition with the resultant hazard of chipping or falling off at this point. Electric detearing affords an automatic method of freeing the piece of this excess material after the dipping operation takes place and so presents to the oven a uniformly coated piece which can be adequately baked to a uniformly satisfactory finish.

Electrostatic Spraying

THERE are certain items that lend themselves more readily to spraying methods. However, the usual operating procedure is wasteful of coating material, and methods have constantly been sought whereby spraying efficiency could be improved. The application of electrostatic principles has resulted in improved coating technique.

In this process, the article to be coated is conveyed past the spray position on any of the usual types of conveyors. At the spray position, insulated electrodes composed of fine copper wires are rigidly supported in a plane at a fixed distance away from the article and have a high voltage electrostatic charge applied to them. The finely atomized paint particles which are sprayed into this field from fixed guns experience a strong force of attraction to the piece and are deposited on it. The resulting coating is extremely uniform, and, since practically all atomized particles experience this force regardless of their direction of travel from the gun, the piece is coated at very high efficiency.

The degree of savings possible is largely dependent upon the shape and size of the piece being coated. On small incidental parts, large savings can be expected. On large flat sheets, the savings are correspondingly less.

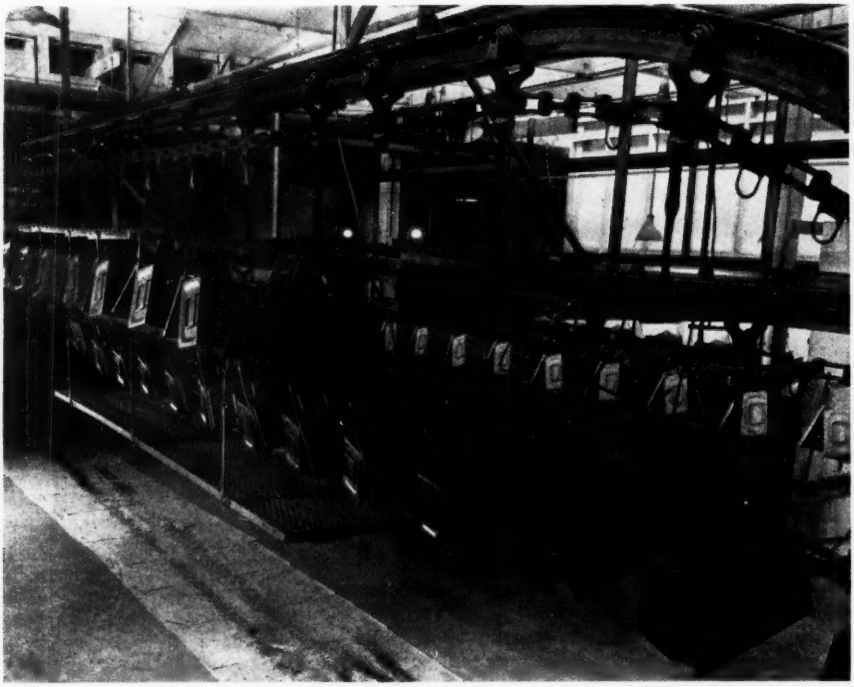
Bright Alloy Plating Process

THERE is no doubt that alloy electrodeposition may involve special problems for the metal-finishing production man. These, however, have been identified and solved in a number of cases. Alloy plating in practice and in research has shown some definite advantages. In general, one may expect alloy plates to be denser, and harder, than plates of the single metals involved. In certain composition ranges, alloy deposits have been found more corrosion resistant, more

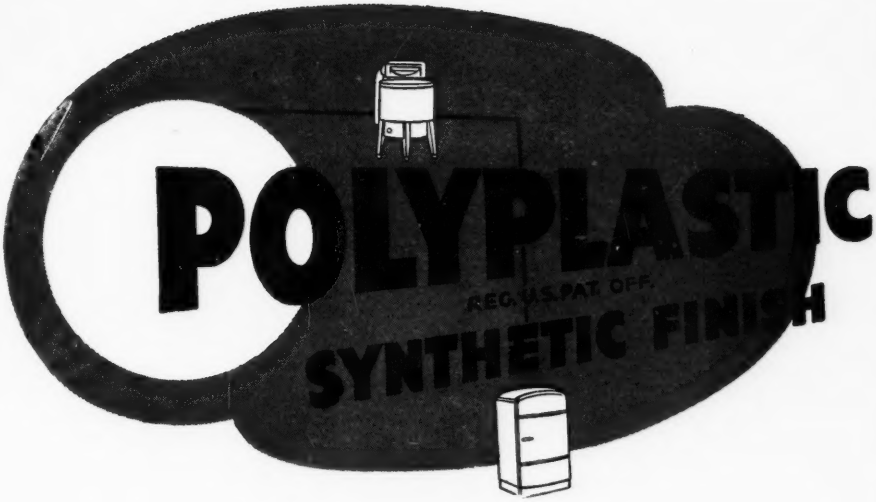
protective for the base metal, brighter than either metal alone, more readily buffed, and tougher and more adherent to the base metal. Alloy deposition has also shown great promise in engineering applications where, from a metallurgical point of view, there are outstanding possibilities. There is little doubt that the war recently ended placed increased emphasis on the study of the physical characteristics of many electrodeposited coatings which may lead to a different conception of electroplating of many metals in the postwar era.

A new bright alloy plating process producing ternary deposits of copper, tin, and zinc has been described by Myron B. Diggin and George W. Jernstedt ("Proc. Am. Elecroplaters' Soc.," 1944). The deposited alloy is said to be bright as it is taken from the plating solution. It is reported to be hard and wear resistant, to have excellent tarnish resistance, to be non-magnetic, and to have high protective value when applied over copper alloys.

An alkaline cyanide type electrolyte is used for the alloy plating process, and, during the development of the process, it was found necessary to make several variations from the standard cyanide bath in order to make the plating range sufficiently flexible for plating room production control. The plating solution is com-



Electrostatically "detearing" T-25 mine boxes at the plant of the Florence Stove Company, Kankakee, Illinois



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In the operation of the bath, it was recommended that the anode area consist of 75 per cent insoluble material, such as cold-rolled steel or carbon; alloy anodes, of the same composition as the deposit, used in steel containers serve as the remaining 25 per cent area. This ratio was chosen because the anode efficiency is nearly 100 per cent, whereas the cathode efficiency is around 35 per cent.

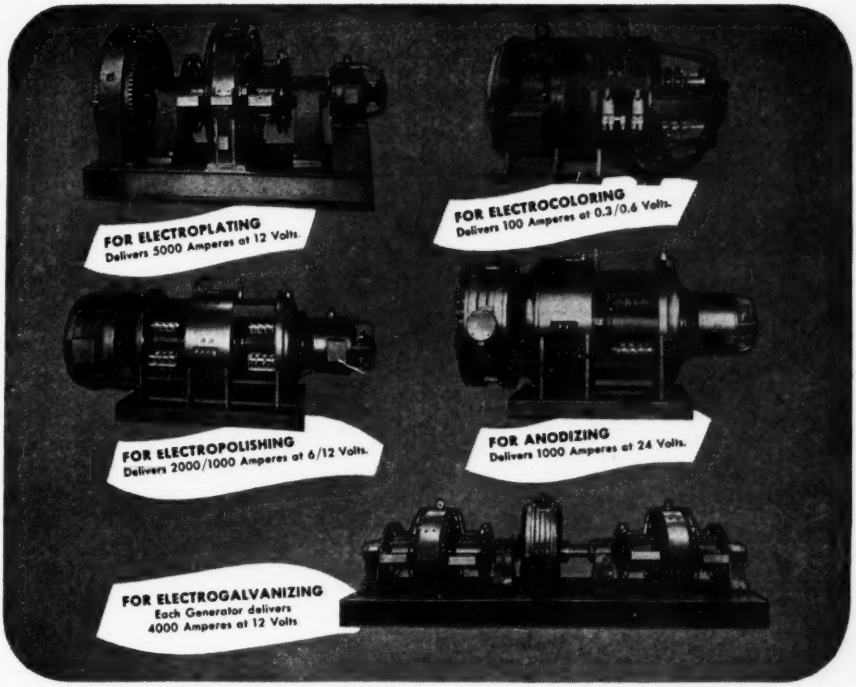
The ternary copper, tin, zinc, alloy deposits are reported to have several advantages not found in the individual metals. One cited is the extreme ease of soldering with rosin as a flux even under production conditions on parts stored for long periods of time. Such deposits have been found to be useful as decorative and protective coatings on fine instruments, particularly in the electrical field because they are non-magnetic. The alloy is reported to be deposited with good throwing power, a point of interest to the production man. However, the deposit may become brittle when deposited to obtain heavy coatings, and plates are usually maintained fairly thin. The corrosion resistance on brass or copper base metals is good; it is reported that 0.0002 inch will pass a 200-hour salt spray test. No recommendations are made for its direct application to steel base. The natural luster reported for the bright alloy finish and the uniformly bright, white color makes it attractive from the appearance standpoint.

Although the bright alloy process may require closer analytical control for the production man, Diggin and Jernstedt point out that there may be applications where the special properties provided may justify its consideration in finishing applications.

Why the Coating Operator Is Concerned With Cleaning Problems

IT is a well recognized fact that the quality of coatings and of finished coated products depends to a great extent on the cleanliness of the base to which the coatings are applied. Coatings, whether they be metallic, such as lead, tin, terne, or zinc, or whether they be organic, such as paints or lacquers or enamels, or whether they be special chemical treatments, such as have been used extensively for many war products, are applied for some specific purpose —one purpose generally being to afford added protection to the steel base. The coating operator should not only be interested in producing a quality product, but, more important, he should also be interested in making the most efficient use of the coating material. Thus, from the standpoint of the coating operator, the cleaning of the base steel prior to coating is one of the most important steps in the total process. These facts of interest to the finishing engineer were given by N. E. Cook at a symposium on cleaning steel before the A. I. S. E. ("Iron and Steel Engineer," April, 1945).

Regardless of the type of coating material used, it possesses certain definite properties so that for any standard unit of thickness a rather definite amount of protection may be expected. Thus, if the most efficient use is to be made of the coating



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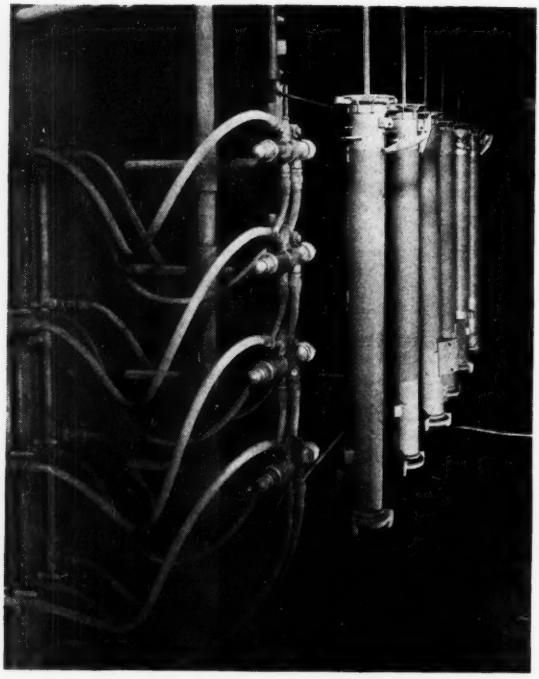

Electrostatic spraying installation for coating rocket launchers

material, certain requirements must be met. **First,** the coating films should be as continuous as possible, with the minimum of porosity. **Second,** the coating films should be as uniform in thickness as possible. **Third,** the coating films should adhere to the base metals as firmly as possible. Test results have shown that the effectiveness of the coating film and the efficient use of coating material can be greatly reduced due to coating on unclean surfaces.

In view of the recognized importance of cleaning, how does the coating operator propose to obtain a clean base material? There are undoubtedly many types of cleaners and cleaning processes, all of which have merit for specific uses. However, confusion may arise due to lack of knowledge of the materials and contaminants to be cleaned from the steel. It is possible that more efficiency would be obtained if the material were cleaned at the source where it could be more thoroughly determined just what it is necessary to clean, based on the processes of production. Many coating operators believe that the slow progress made in general on cleaning problems can be attributed, to a certain extent, to a lack of mutual understanding on the problems involved on the part of the steel producers, cleaning technician, suppliers of equipment, and coating operators as a group. A mutual understanding of the real problems involved would result in simplification and standardization of cleaning processes prior to coating.

The coating operator may be dealing with relatively small tonnages of material, and the costs are naturally higher than when the major part of the cleaning is done at high speeds and in large units. Thus, considerable savings in the overall total cost of the finished product might be realized if the material were completely, or almost completely, cleaned at the source. It is generally not advisable to attach too complicated a cleaning unit to a coating operation, especially if the coating operation is a continuous or semi-continuous one, for the reason that there is always the

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possibility of developing trouble in the cleaning end of the operation which might slow down, or tie up completely for sometime, the coating unit operation. Thus, here again are seen the advantages of having the steel in such condition that elaborate cleaning is not needed just prior to the coating operation.

Constant Solution Purification Essential in Production Plating of Bright Nickel

SINCE the introduction of bright nickel plating processes, a large amount of information and experience has been gained regarding the effects of contaminants on the operation of bright nickel plating solutions, on the bright nickel deposits, and on the specifications as to the use of bright or semi-bright nickel deposits. It appears that a large share of the criticisms originally made against the operational difficulties of bright nickel processes in production can now be attributed to specific effects of metallic and non-metallic impurities. This information was presented by Bernard C. Case in the August issue of "The Monthly Review," official publication of the American Electroplaters' Society, in a paper entitled "Quality Nickel Deposits Maintained by Continuous Solution Purification." The application of continuous solution purification principles in the production plating of bright nickel has provided bright nickel deposits of a constant and reproducible quality and demonstrated that test panel quality of bright nickel deposits can be obtained in any sized production plating bath on any base metal.

According to Mr. Case, studies on purification of bright nickel baths have disproved the statement "If you can't see the effect of an impurity it isn't going to hurt anything." Although deposits may be bright, solution contaminants may result in plates which have very poor physical properties and inferior ability to protect the base metal from corrosion.

Satisfactory purification schemes for continuous purification of bright nickel solutions have been worked out based on treating the solution with activated materials that remove the organic contaminants, and low-current density selective plating out of contaminating metallics. To the production man concerned with the finishing of many metal parts by the conventional bright nickel methods, this is of interest because it eliminates the necessity for intermittent purification, during which production must usually be suspended. In addition, this large step forward in the operation of bright nickel plating baths will undoubtedly result in less trouble, lower cost of operation, and the consistent production of the highest quality deposits.

What to Expect in Rubber Lined Equipment

AT the time of Pearl Harbor, the linings used in equipment for handling the corrosive chemicals used in the finishing industry were nearly all natural crude rubber recipes. Since November 1, 1943, the linings used in tanks, pipe, drums, and so on, have been limited to general purpose synthetic rubber of which 95 per cent or more has been GRS, and the small balance GRM and GRI. H. C. Klein (The B. F. Goodrich Company) speaking before the Cleveland, Ohio Electrochemical Society symposium on "Modern Metal Protection" ("Steel," October 15, 1945) predicted that natural crude rubber, when it becomes available, will again be the most prevalently used lining because it is easier to handle and install than lining made from synthetics. It is generally considered to require more time to install the synthetic materials in view of the fact that the synthetic

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rubbers lack natural building tack and often require preshrinking before they are applied to the vessel to be lined.

While it is true that some synthetic rubber linings such as GRM, and thermoplastic linings, such as "Koroseal," were in use to a limited extent, the rubber industry had practically no background on the use of GRS rubbers for lining equipment for handling corrosives. In general, the types of synthetic linings may be divided into two groups; namely, one, thermoplastic materials such as Koroseal, and two, rubber linings which have been classified into the following groups: (1) GRS—Buna S type, Butadiene Styrene Copolymer—not oil resisting, (2) GRA—Buna N type, Butadiene Acrylonitrile Copolymer—oil resisting, (3) GRM—Neoprene type, Chloroprene Polymer, and (4) GRI—Butyl type, Isobutylene Polymer.

Early in 1942, the only natural rubber available was from the nation's stockpile, and the production of general purpose synthetic rubber, GRS, was practically nil. Hence, neither of the materials were permitted for many items made during prewar days. When the first rubber orders were written, it was ruled that neither natural crude rubber nor synthetic rubber could be used in connection with plating or anodizing equipment. However, thermoplastic materials such as Koroseal were permitted. The end of the war found nearly all types of equipment being lined with synthetic compounds, which appeared to do a job comparable to the natural crude rubber recipes previously used.

It can be said, in general, that synthetic rubber linings tend to slightly discolor certain chemicals to a higher degree than did natural rubber compounds, but fortunately, in many applications, this is not important and has caused very little concern. On the other hand, certain synthetic rubber linings have been developed that discolor acids less than did natural crude rubber materials.

One outstanding example is the handling of the various bright nickel plating solutions that are on the market. One of the first compounds developed out of synthetic rubber proved to be capable of handling nearly every bright nickel plating solution without any contamination of the bath and without detrimental effect on the nickel plate itself.

The largest volume of rubber lined equipment is sold for handling muriatic acid. According to Klein, many people using rubber lined equipment were of the opinion that GRS general purpose synthetic rubber would not prove satisfactory for this acid. In general, this is true as far as soft compounds of GRS are concerned, but GRS can be made in flexible, hard, and ebonite types, and the resistance of such grades to muriatic acid is comparable to natural crude rubber of similar hardnesses. Before the war, much equipment for handling muriatic acid was lined with soft natural rubber compounds. Soft natural rubber is also attacked by muriatic acid, however, as it is attacked, a hard film forms on the surface of the natural soft rubber, and this hard surface in turn tends to prevent further penetration of the acid. In the case of soft GRS stocks, this hard surface is not formed, hence the muriatic acid slowly penetrates the entire lining. It is for that reason that the majority of linings supplied today for muriatic acid are of a flexible hard GRS compound. Weak solutions of sulfuric acid as used for pickling or cleaning before electroplating offer no particular problem as even soft GRS grades handle it satisfactorily.

The thermoplastic linings, such as Koroseal, are applied directly to the

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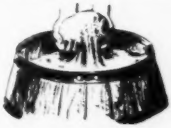
- **No "splash-burns"**
- **Easily, safely stored**
- **Formulae developed to fit specific requirements**

TROXIDE . . . a bright, new name in the "bright-dipping" field . . . offers industry an amazing degree of safety . . . plus an efficiency that meets *specific* job-requirements. A scientifically developed compound of dry, inert chemicals, TROXIDE becomes active *only* when dissolved in water . . . and can be handled easily and safely.

When TROXIDE Bright-Dip Formulae are used, the hazards commonly present in the conventional bright-dip formula are eliminated . . . no dangerous, corrosive fumes . . . no "splash-burns" from accidental splashing. The solutions are easy to prepare . . . and economical, too. In addition, TROXIDE Bright-Dip Formulae will give you brilliant finishes.



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Waverly Petroleum Products Co., Drexel Bldg., Philadelphia 6, Pa.

East: **Safety & Maintenance Co., Inc., 601 W. 26th St., New York 1, N. Y.**

steel walls of the containers by using proper adhesives, and vulcanization of the lining before it has been adhered to the container is not required. Before the war, these materials were strictly special purpose linings and were only used where rubber linings would not handle the corrosives involved. While the cost of these special thermoplastic linings is generally considered to be higher than natural crude rubber or general purpose synthetic linings, there appear to be a number of successful installations, especially in electroplating.

The principal advantages cited by Klein of Koroseal in electroplating tanks are the ease in making field repairs and its extremely low absorption of plating solutions. At the present time, a disadvantage of Koroseal linings is that the maximum temperature for which they can be recommended is 150 deg. Fahrenheit.

The metal-finishing production man should keep in mind that there are many types of linings available for handling the corrosive chemicals which must be used, many of which are designed for specific service conditions. Thus, in the purchase of such equipment, as much detailed information concerning the actual service conditions should be made available as is possible.

Hisey Electric Grinders and Buffers. A 36-page catalog now available from The Hisey-Wolf Machine Co., Cincinnati, Ohio, provides illustrated, descriptive, and tabular information on bench and floor grinders, disc grinders, buffers and polishers, snagging grinders, tool post grinders, and other grinding and buffing equipment and accessories. Copy of Catalog 70 free upon request.

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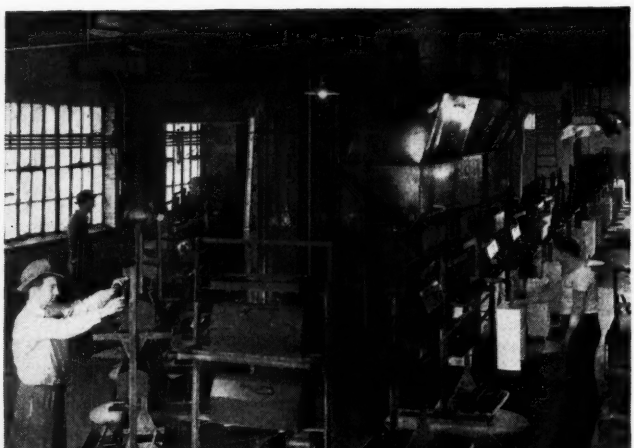
Revolving Work for Spraying

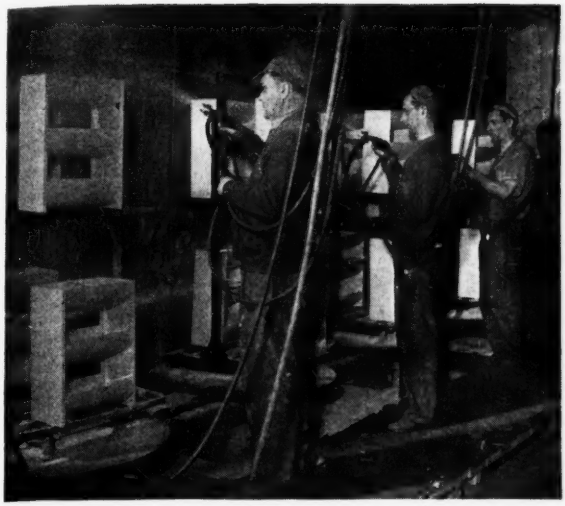
By JOHN E. HYLER

METHODS used in revolving work for spraying have differed considerably in various plants, depending on the particular nature of the work to which finishing materials are being applied. Wherever it is readily possible to revolve the work, the job is greatly simplified and speeded as against moving the gun around the work. A turntable of one kind or another is often the solution to the problem. One or two cases have been noted where parts quite small in size were to be revolved and where an old phonograph with its turntable was used for the purpose. In such a case, the mechanical rotation of the turntable can be used, if desired. Most turntables used for parts being sprayed are revolved by hand.

Though mentioned, the use of an old phonograph for spray painting turntable service is not recommended except for the very rare case where it may be desired to rotate a cylindrical



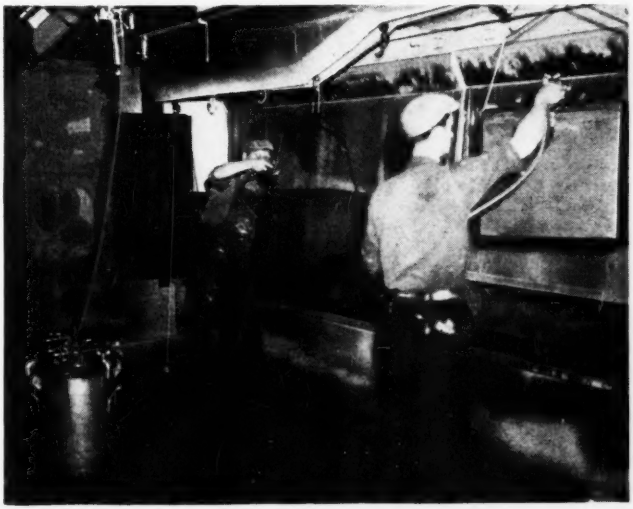
This illustration comprises an overall view of a conveyor system incorporating a series of turntables upon which work is mounted for spray painting. *(Photo Courtesy Gifford-Wood Co., New York, N. Y.)*



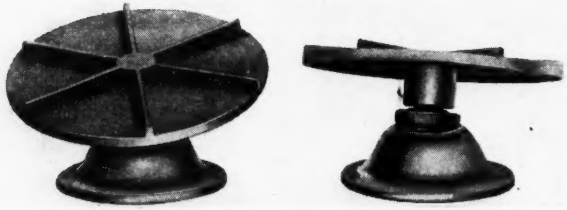
Operators are shown spraying cabinets mounted on turntables of a conveyor system.
(Photo Courtesy Gifford-Wood Co., New York, N. Y.)

object at considerable speed which can be properly supported in this manner. As a matter of fact, there are bench-type turntables made for spray painting service by leading manufacturers of spray painting equipment. They are ideal for revolving small objects. In some instances, it is advantageous to have a turntable of this type that can be tilted, therefore, bench turntables are provided in both tilting and non-tilting models. One bench tilting type of turntable is mounted on special supporting bars, and is so arranged that it can be tilted 45 degrees, either forward or backward, and can be rotated while fastened securely in a tilted position. The length of supporting bars supplied with a turntable of this kind depends on the width of the spray booth in which it is to be installed.

There is an occasional instance in which work that is relatively long and round can be efficiently sprayed by



Enroute to an oven for baking, metal housings held by swiveling grapples that engage in the louvers are shown being sprayed in front of a water-wash located in the background.
(Photo Courtesy Link-Belt Co., Chicago, Ill.)



Tilting bench turntables (*Photo Courtesy The DeVilbiss Co., Toledo, Ohio*)

holding it between centers in an old lathe. It is a fairly simple matter to rig up an old lathe that has outlived its days of usefulness for regular service and drive it so the speed of rotation of a part held between centers will be consistent for spraying. It is also possible to rig up a special fixture with multiple centers so that a number of similar pieces can be revolved at once in close adjacency to one another and all spray painted at the same time. However, this particular problem is one that does not often arise.

There are some cases in which it is very helpful to have a turntable that can be made to rotate under power when desired or to assume a non-rotating position. This need has been met by one manufacturer of spray painting equipment who has provided a turntable fitted out with an air motor for revolving it and with a foot pedal at the floor line for controlling the motor. By simply depressing the foot pedal, the spray gun operator causes the turntable to revolve. When the pedal is released, the rotating action ceases.

Floor type turntables for installation in spray booths are used for handling articles of larger size, and they may be of either a tilting or non-tilting type. In general, such turntables revolve on a center stem, but there are some instances in which very heavy work is to be handled and revolved where this design will not suffice. In those cases, some manufacturers of spray painting equipment provide turntables with a circular track on which the turntable proper revolves on rollers. A heavy object cannot cock a turntable of this type to one side if the load happens to be somewhat off center.

Many of us are acquainted with the type of turntable used for handling objects of considerable size, but fairly light in weight, which is provided with a compressed air lift. These models each have a cylinder installed under the floor in a vertical position and in alignment with the central stem on which the table revolves. In fact, the central stem of the turntable, in this case, is the piston rod of the power cylinder. A hand or foot valve is arranged, as preferred, for operating the cylinder. Thus, any article on the turn-

Non-tilting floor turntable (*Photo Courtesy The DeVilbiss Co., Toledo, Ohio*)

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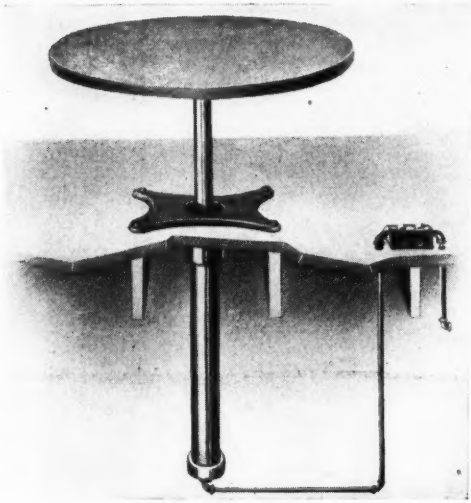


Air lift turntable
(Photo Courtesy The DeVilbiss Co., Toledo, Ohio)

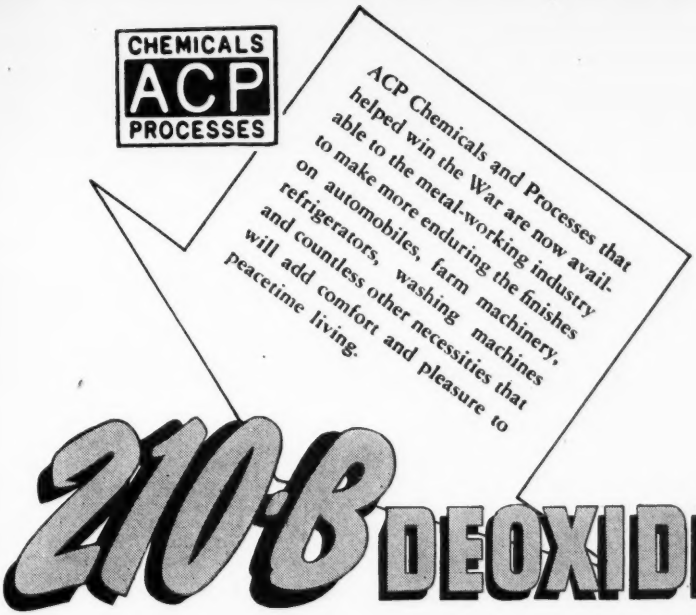
table may be raised to any desired height for spraying within the range of the cylinder mentioned.

If and when cases arise that work of great weight must be held on a turntable and revolved for spraying, it is interesting to know that there is at least one manufacturer of large lifts, made for various industrial purposes, which incorporate large power cylinders for the lifting means. It is not definitely known that this particular equipment has been applied for spray painting, but we are simply citing what could be done in such a case. Very heavy work could both be raised to any desired height and revolved for spraying. There are also other manufacturers that have made certain types of special spray painting turntables, though they do not specialize in spray painting equipment in general.

Did you know that conveyor systems are sometimes arranged to carry a series of turntables? There are at least two manufacturers of conveyors that have produced conveyor turntables. Large cabinets, for instance, can be held on individual turntables while they are being transported from point to point. Along this same line, large workpieces could be routed through large spray booths while held on such turntables. Moreover, it has come to the author's attention that some manufacturers have supplied turntable trucks. We have not had an opportunity to examine these trucks and it is not known whether the incorporated turntables were adapted for spray painting practice. It is certain, however, that trucks fitted with turntables suited for this purpose could be produced, if desired.

Again, some leading monorail manufacturers have developed monorail turntables so that relatively heavy loads, suspended from a monorail, can be turned as desired. Using such equipment in spray painting practice should prove advantageous in some places. Pieces of work traveling on overhead chain conveyors have, in various cases, been suspended on swiveling grapples which permitted them to be turned for spraying enroute.

Wheelabrator Swing Tables. Complete information regarding the Wheelabrator Swing Table for the blast cleaning of parts is contained in Catalog No. 214 published by American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind. Detailed information on each of the four sizes available, including construction features, overall dimension drawings, and specifications, is contained in the 12-page catalog. In addition, sections of the catalog are devoted to ventilation requirements, operating performance facts, installation photographs, and a list of users of the equipment. Copy free.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Bricker & Andes, 318 Atlantic Ave.
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Van Camp Products & Sales Co.
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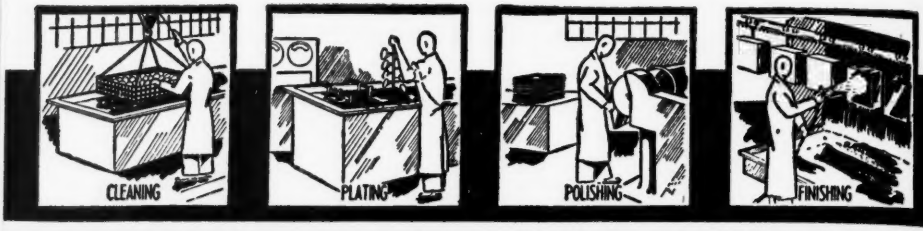
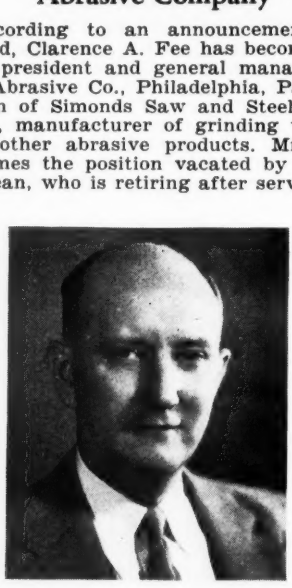


News of the Industry

Becomes President of Abrasive Company

According to an announcement received, Clarence A. Fee has become the new president and general manager of the Abrasive Co., Philadelphia, Pa., Division of Simonds Saw and Steel Company, manufacturer of grinding wheels and other abrasive products. Mr. Fee assumes the position vacated by J. W. McLean, who is retiring after serving in this capacity for 16 years and being associated with Simonds Saw and Steel Company for 44 years.



Clarence A. Fee

Coming to Philadelphia from Chicago, Ill., where he was Chicago branch manager from the Simonds Saw and Steel Company, Mr. Fee continues his long service to the Simonds organization in this new role. A native of Chicago, Mr. Fee took a clerical position with the Chicago Simonds factory office in 1912. In 1919, he joined the sales department and five years later became office manager in that sales office. He was made Chicago branch manager in 1929.

In the Illinois metropolis, Mr. Fee was active in the Chicago Chamber of Commerce and the Illinois Manufacturers Association.

Manderscheid Moves to New Quarters

To provide space for increased manufacturing capacity necessary to meet the demand for Presto products, The Manderscheid Company has moved to 810 Fulton St., Chicago 7, Ill. Floor space at the new address is three times that formerly occupied at 605 West Washington Street.

DeVilbiss Spray Painting Courses

Four one-week courses in the first half of the 1946 School of Spray Painting conducted by The DeVilbiss Co., Toledo, Ohio, will be devoted to industrial finishers. Free to users of DeVilbiss spray painting equipment, these courses will be identical in classroom instruction and shop work. Scheduled starting dates are Jan. 14, March 11, April 8, and June 10.

Interested industrial finishers are urged to write for reservations at least two weeks in advance of any session.

Opens Cincinnati Technical Section

The International Nickel Company, Inc., announces the opening of the Cincinnati Technical Section of its Development and Research Division which will be located at 1715 Carew Tower, Cincinnati, Ohio. Richard B. Kroph, metallurgist, and formerly district manager of the Copperweld Steel Company at Hartford, Conn., has joined International Nickel and will be in charge of the new section which will furnish technical assistance to industry in the territory embraced by southwestern Ohio, the southern half of Indiana, and Kentucky.

Verner Awarded Du-Lite Fellowship

Continuing its research program in metal finishing at Syracuse University, the Du-Lite Chemical Corp., Middletown, Conn., has awarded a fellowship to H. Grey Verner. Mr. Verner will carry on his work in the chemical engineering department of the L. C. Smith College of Applied Science where facilities for metal-finishing research were established sometime ago.

Mr. Verner comes to Syracuse from Wilmington, Del., where he has been a chemical engineer at the Du Pont experimental station. He is a chemical engineering graduate of the University of Pittsburgh where his work earned him high honors. He was a member of the American Institute of Chemical Engineers as a student and was awarded membership in the national honorary engineering fraternity, Sigma Tau.

Eberhardt Elected Vice President of Kidde

The board of directors of Walter Kidde & Co., Inc., announces that Paul W. Eberhardt has been elected to the office of a vice president. His principal duties will include management of domestic sales of the company's fire-fighting equipment in aviation and general industry, together will general supervision of field selling activities.

Mr. Eberhardt joined Walter Kidde & Company in 1926 as manager of the Public Utilities Department to assist in the development and sale of fire protection equipment for this field. In 1928, he was made manager of the Industrial Department (the Public Utilities Department being merged therein) and, in the early part of 1944, was given in addition full

Paul W. Eberhardt

responsibility for the activities of the field sales force.

Born in Pitcairn, Pa., Mr. Eberhardt attended the University of Pittsburgh, Carnegie Tech, and took an extension course at the University of Pennsylvania. He is a member of the Sales Executive Club, National Safety Council, American Institute of Electrical Engineers, American Society of Safety Engineers, and the National Fire Protection Association.

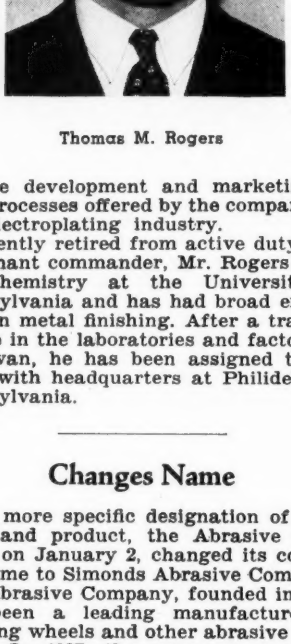
Sylvania Acquires Wabash

Walter E. Poor, president of Sylvania Electric Products, Inc., announces that the Wabash Appliance Corporation, large independent manufacturer of photoflash and incandescent lamps, merged with the Wabash Photolamp Corporation and Birdseye Electric Corporation on January 1, 1946 to become a wholly-owned but independently operated Sylvania subsidiary. A. M. Parker remains as president and general manager of Wabash with headquarters at Brooklyn, N. Y. Sales staff, sales policies, product brands, and distribution outlets remain unchanged.

The Brooklyn plant will continue the manufacture of photolamps, incandescent lamps, reflector lamps, and infrared lamps, with augmented production of light conditioning and other standard light bulbs.

Thomas M. Rogers Joins H-VW-M

Thomas M. Rogers has joined the field forces of the Hanson-Van Winkle-Munning Co., Matawan, N. J., and will work



Thomas M. Rogers

on the development and marketing of new processes offered by the company for the electroplating industry.

Recently retired from active duty as a lieutenant commander, Mr. Rogers studied chemistry at the University of Pennsylvania and has had broad experience in metal finishing. After a training course in the laboratories and factory at Matawan, he has been assigned to the field, with headquarters at Philidelphia, Pennsylvania.

Changes Name

For more specific designation of company and product, the Abrasive Company, on January 2, changed its corporate name to Simonds Abrasive Company. The Abrasive Company, founded in 1892, has been a leading manufacturer of grinding wheels and other abrasive products. In 1927, the company was purchased by the Simonds Saw and Steel Company, Fitchburg, Mass., and thus became a division of the Simonds organization.

Simultaneous with the change in name, a new Simonds master trademark has been officially adopted. This new trademark will identify all products of the Simonds Abrasive Company as well as those manufactured by all branches of the Simonds Saw and Steel Company. No change in ownership, management, or policy has been made.

Resigns as President

Victor F. Mutch has resigned as president of the Cordo Chemical Corp., Norwalk, Conn., supplier of industrial coatings, finishes, lacquers, and adhesives. Mr. Mutch intends to continue in the same line of business, specializing in the manufacture of plastic base coatings.

Pellington Appointed Manager of Sales

The Puritan Manufacturing Co., Waterbury, Conn., manufacturer of Presaponified Wonderbar Buffing Composition, announces the appointment of Russell H. Pellington as manager of sales. Since 1924, Mr. Pellington has been selling and servicing polishing and buffing compositions in the New England states. He is a member of the Hartford Branch of the American Electroplaters' Society.

Du Pont Appoints

The appointment of Samuel G. Baker as assistant general manager of the Electrochemicals Department of E. I. du Pont de Nemours and Co., Inc., is announced by F. S. MacGregor, general manager. Milton Kutz, who has been acting assistant general manager, becomes a special assistant to Mr. MacGregor.

A native of Tacoma, Washington, Mr. Baker first joined Du Pont as a worker on a powder production line. Later, he was graduated from the University of Washington with a degree in chemical engineering and rejoined Du Pont as a chemist in 1925. In 1939, he became director of sales of the department. Four years later, Mr. Baker joined the Electrochemicals Department as director of the Electroplating Division.

Mr. Kutz's career in the chemical industry began in 1897 when he joined the Roessler and Hasslacher Chemical Company as an office boy, rising in 33 years to vice president and a director of the firm. When Roessler and Hasslacher was acquired by Du Pont in 1930, he became director of sales. In 1933, he was appointed assistant general manager of the department.

Harry S. Walker Appointed Manager

The C. M. Hall Lamp Company, Detroit, announces the appointment of Harry S. Walker as manager of the Radiant

Harry S. Walker

Heat Division. He replaces Thomas P. Cusack, Jr., newly appointed manager of the Sales Development Division for the entire company.

Mr. Walker for the past eight years has represented the Westinghouse Electric Corporation on various engineering and sales assignments in New York, Pittsburgh, Toledo, Louisville, and Detroit.

Distributor Appointed by Gabex

Harris Pump & Supply Co., Pittsburgh, Pa., has been appointed distributor for the Gaybex Corp., Nutley, N. J., manufacturer of degreasing compounds, solvents, and cleaners.

In addition, William A. Hancock has been appointed sales manager of the Gaybex Corporation to succeed John B. Moore who will assume the post of president and general manager of the company. Mr. Hancock was formerly with the Eastern Aircraft Bloomfield Division, General Motors Corp., Bloomfield, N. J., as supervisor of expediting and purchasing contacts.

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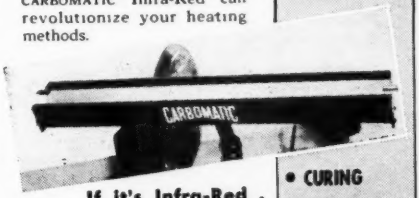

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Ferro Opens St. Louis Office

The Ferro Enamel Corp., Cleveland, Ohio, announces the opening of a St. Louis office which will serve as district headquarters and will be in charge of J. A. Thompson, who for many years has represented Ferro Enamel in the St. Louis district.

J. A. Thompson

Manufacturer of porcelain enamel, inorganic finishes for household appliances, cooking utensils, signs, and other products, in addition to inorganic finishes and porcelain enameling furnaces and equipment, Ferro will have its new offices in The Arcade Building in St. Louis.

Moves Offices

Walter Kidde & Co., Inc., has moved its sales and executive offices from 140 Cedar St., New York City to its main plant at 1020 Main St., Belleville, N. J. To ensure a high level of sales and efficiency of manufacturing, the plant has become active in new production development. The company is branching beyond the fire extinguishing field into markets which employ either the type of manufacturing facilities Kidde now has or the expanded selling organization the company is now building.

Among the products which are now in production at the Kidde plant is the Youngstown-Miller Plasticoater, a machine that is used for heating plastic compounds into which metal parts are immersed to form a protective coating for shipping or storage.

J. MacDonald Smith Changes Post

J. MacDonald Smith, for many years an important factor in the business of the Hanson-Van Winkle-Munning Company and its predecessor, A. P. Munning and Company, has retired from Hanson-Van Winkle-Munning and will associate himself with the Sundmark Supply Co., Los Angeles, Calif., distributor of Hanson-Van Winkle-Munning products.

For many years, Mr. Smith was president of Kabushiki Kaisha, A. P. Munning and Co., Kobe, Japan. In 1940, he returned to the United States. For a brief period, Mr. Smith was export manager of the Hanson - Van Winkle - Munning Company, and later was district manager with headquarters in New York.

J. MacDonald Smith

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Udylite Appoints Distributor

L. A. Davies, owner and operator of the Davies Supply and Manufacturing

L. A. Davies

Co., 4 North 8th St., St. Louis, Mo., has been appointed by The Udylite Corp., Detroit (marketer of plating processes, equipment and supplies), as distributor for Missouri, Arkansas, Oklahoma, Kansas, Texas, and Louisiana.

After graduation from Purdue University with a bachelor's degree in chemical engineering, Mr. Davies joined the research staff of the Formica Insulation Company, Cincinnati, and then, in 1927, went to the Pacific Coast to represent The Udylite Corporation. In 1931, Udylite transferred Mr. Davies to Chicago as district manager. He remained in that position until entering the Navy in 1942. Upon his discharge from the service, he established the present business in St. Louis.

Extends Washington Sales Area

The extension of the area of the Washington sales office of The Dow Chemical Company to include Virginia, North and South Carolina, Georgia, and Florida, has been announced by Leland I Doan, vice president and director of sales. The move became effective January 1 and the Washington staff is being augmented to handle the additional activity. The Southeastern territory involved has formerly been covered by the New York office.

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BESIDES, with Sparkler Filters you obtain *rapid circulation, surface smoothness, solutions free of solids, the bright polish.* Ample cake space assures uniform, superb quality filtration at all times. HARD RUBBER CONSTRUCTION.

In continuous filtration, use SPARKLER'S AUXILIARY SLURRY TANK, AGITATOR AND PROPORTIONING PUMP, for accurate, automatic addition of filter aid.

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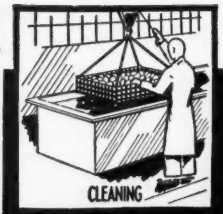
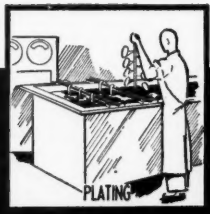
SPARKLER MANUFACTURING COMPANY
255 LAKE STREET MUNDELEIN, ILLINOIS

WRITE FOR FULL DETAILS

SPARKLER HORIZONTAL PLATE FILTERS



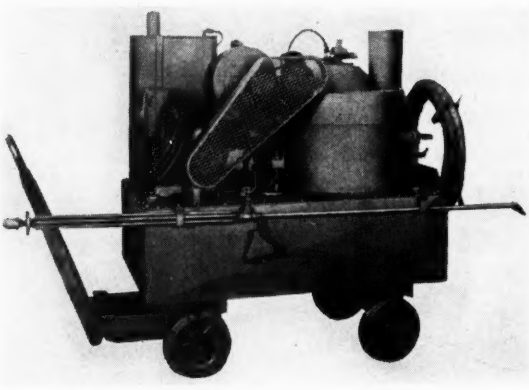


New Equipment and Materials

Oakite-Vapor Cleaning Unit

A multiple-duty steam cleaning unit to be known as the Oakite-Vapor Cleaning Unit is announced by Oakite Products, Inc., 54C Thames St., New York 6, N. Y. The unit comprises a self-contained, down-draft flame, oil-fired, enclosed coil-type steam generator that is designed to deliver hot vaporized cleaning solutions under selective pressures up to 200 lb. for the quick and easy removal of grease, grit, grime, paint, and other deposits from surfaces. A wide range of fuel oils, such as No. 1, No. 2, or No. 3 fuel oil, kerosene, or gasoline, may be used to operate the unit. Due to its flexibility of steam pressures, the unit may be used for many different types of light and heavy duty cleaning jobs.

Unusually rugged in construction and built for long, continuous, trouble-free service, the Oakite-Vapor Cleaning Unit is said to have tremendous reserve power and operate without vibration. The unit is claimed to incorporate many features that provide for simplicity and ease of operation and maintenance, rapid steam generation, unusual solution tank capacity, effective operation of two steam guns simultaneously, safety against fire, and other advantages.



Oakite-Vapor Cleaning Unit

"Karbate" Sectional Cascade Cooler

Designed for the efficient cooling of corrosive liquids and gasses, a sectional cascade cooler to be known as the "Karbate" is now available from the National Carbon Co., Inc., 30 E. 42nd St., New York, N.Y. Featuring corrosion resistance, high heat transfer rate, resistance to thermal shock, and freedom from corrosion scale formation, the unit is recommended for service with practically all acids, caustics, and organic solvents at

"Karbate" Sectional Cascade Cooler

pressures up to 75 lb. per square inch and temperatures up to 338 deg. F. (170 deg. C.). Minor changes in the method of applying the cooling water permit the handling of gases well in excess of this temperature.

Nine feet long, single pipe Karbate cooler sections are stacked to form a series flow vertical bank and are held in place by steel tie-rod assemblies which form a rigid supporting structure. Gaskets are furnished in either synthetic rubber or asbestos composition as required. A standard steel water distributor is mounted on the tie-rod assemblies, and the distributor can be accurately adjusted to assure uniform cooling water distribution over the pipe. The compact construction offers close pipe spacing and eliminates the necessity of redistribution baffles. Maximum effective external surface areas of approximately 120 square feet are available in all of the five cooler sizes in the maximum recommended cooler height of 6 feet. The complete cooler assembly can be easily dismantled for the addition or replacement of interchangeable sections.

Richardson-Allen Variable Rectifier

The Rectifier Division of the Richardson-Allen Corp., 15 W. 20th St., New York 11, N. Y., announces a variable rectifier which is said to be particularly adaptable in the field of electrochemical applications, including electroplating, electrocleaning, electroanodizing, electrodescaling, electropickling, and so on. Built in single and double units for either wall or bench mounting, the rectifier is available in three models designated as the Nos. D 190 A, D 191 A, and D 207 A.

The Model No. D 190 A operates at 25 amperes, 6 volts, is convection cooled, and measures approximately 14 inches high x 8 inches wide x 12 inches deep. The Model No. D 191 A operates at 37/75, 12/6 volts, is fan cooled, and measures approximately 22½ inches high x 14 inches wide x 14 inches deep. The Model No. D 207 A operates at 75/150, 12/6 volts, is fan cooled, and measures approximately 22½ inches high x 14 inches wide x 14 inches deep. The output of each model is continuously variable from zero to full load by means of one control, and complete overload protection is afforded. In addition, in the fan-cooled types, the rectifier is said to provide automatic protection against fan failure and ventilation restrictions.

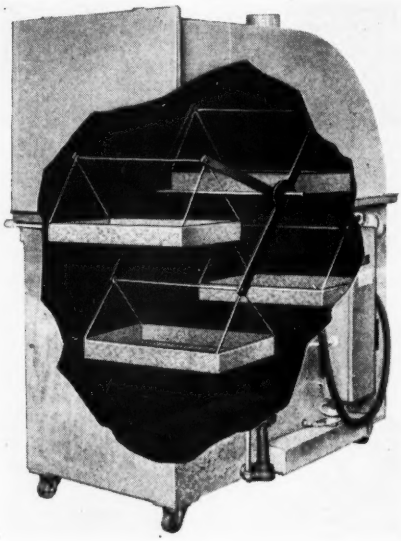
To increase the power rating, the Richardson-Allen Variable Rectifier, which is equipped with an output voltmeter and ammeter, can be used in multiple. In that portion of the d.c. power field in which selenium rectifiers are not readily applicable, the company is prepared to supply

Richardson-Allen Variable Rectifier

units which utilize the latest types of vacuum tubes. The individual application will dictate whether the tubes are high vacuum, mercury vapor or inert gas types.

Phillips "Rotomatic" Vapor Degreaser

The addition to its line of metal-cleaning machinery of a vapor degreaser to be known as the "Rotomatic" is announced by the Phillips Manufacturing Co., 3440 W. Touhy Ave., Chicago 45, Ill. The unit features a loading device consisting of a rotating frame from which baskets are suspended in a Ferris wheel manner. The rotating frame is motor driven and governed by an automatic limit switch and interval timer which brings each basket to the opening for loading and unloading and automatically swings it into the vapor bath for the correct cleaning time. In addition to assuring proper cleaning, the system is said to provide for increased solvent economy since, by governing the speed of the operation, it eliminates costly dragout of solvent vapor, as well as minimizes the possibility of spreading fumes and odors.



Cutaway view of Phillips "Rotomatic" Vapor Degreaser showing motor-driven loading device

The Phillips Rotomatic Vapor Degreaser is completely hooded, with hanging door covering the opening for loading and unloading baskets, and is available in three sizes which are designed to handle approximately 1,200, 3,000 or 4,000 lb. of work per hour.

Du Pont Sodium Hydride Process for Descaling Metals

Announcement of a sodium hydride process for the descaling of metals is made by E. I. du Pont de Nemours and Co., Inc., Wilmington 98, Del. The scale, reduced by sodium hydride dissolved in fused caustic, is said to be virtually blasted from the surface of the metal by the generation of steam in a subsequent water quench. To complete the process, a few seconds dip in acid to brighten the surface is all that is stated to be necessary, the sodium hydride bath being effective on such metals as nickel, cobalt, and copper, as well as on alloy and stainless steels.

Advantages claimed for the process include: (1) the bath, containing active sodium hydride, penetrates throughout the work and uniformly descales all surfaces; (2) all grades of alloy steels can be descaled interchangeably using the same procedure; (3) there is no loss of metal; (4) no harm can result from too long treatment; (5) since the bath does not attack metal at its working temperature, an ordinary low carbon steel tank can be used; (6) no electric current is necessary; (7) the working temperature of 700 deg. F. is sufficiently low that there is no deleterious effect on the structure of the metal; (8) the hydride bath does not produce hydrogen embrittlement of the steel; and (9) savings in time, space, and disposal of waste residue are effected.

"K. P." Soapless Cleaner

An all-purpose soapless cleaner that is said to sud instantly in hard, soft, or sea water is now being marketed under the trade name "K.P." by the K. P. Chemical Co., 16 West 46th St., New York 19, N. Y. Prepared in powdered form and packed in 50-lb. cartons and 350-lb. drums, the cleaner, it is claimed, contains no abra-

sive and is entirely soluble, with each ingredient being an active useful detergent.

According to the manufacturer, K. P. Soapless Cleaner is effective in cutting away grease and grime from marine engines and cargo areas. Mixed with sea water, the material can be used to remove oil slick in basins and drydocks. In heavy steel industries, the solvent is said to effectively clean large castings and grease-coated machinery.

Cargille Hydrion Short Range pH Test Papers

Six Hydrion Short Range pH Test Papers are announced by R. P. Cargille, 118 Liberty St., New York 6, N. Y. According to the manufacturer, color changes for small pH intervals are so well defined with these papers that readings can be made to 0.25 pH. The six papers cover the range pH 1 to 14. A transparent plastic dispenser provided holds two papers in roll form.

The Cargille Hydrion Short Range Papers supplement the original Hydrion Wide Range Papers and are said to be a useful supplement to any other method of determining pH. Any two papers required for special purposes are available in a dispenser, or a complete set of short range and wide range papers with refills can be obtained.

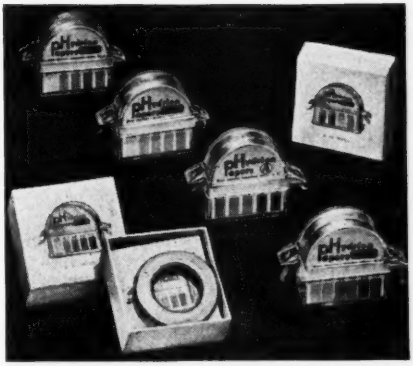


Illustration showing Cargille Hydrion Short Range and Wide Range pH Test Papers together with refills

SMOOTH, GLISTENING FINISH

Plus Speed and Low Cost

ROBERTS BURRING COMPOUNDS offer you cleaner work and good color, with all remaining tool marks well blended. Preserves all essential dimensions.

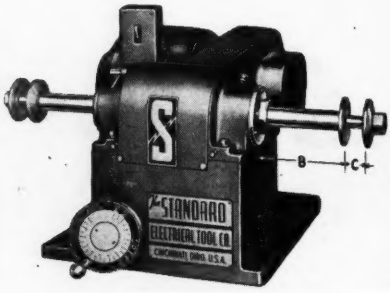
The swift accurate cutting action of Roberts Burring Compounds reduce wear on polishing wheels and buffs. Adheres to wire wheels as well as Tampico wheels.

Send for a trial order today.

ROBERTS ROUGE CO.
STRATFORD • CONN.

"Standard" Type 1BVB Buffing and Polishing Machine

The Standard Electrical Tool Co., 2518 River Road, Cincinnati 4, Ohio, announces the addition of an infinitely variable speed buffing and polishing machine, designated as the Type 1BVB, to its line. The unit is powered by means of a 1 h.p. motor and is operated through a toggle switch. By means of the "Speedial" control conveniently located at the front of the machine, any spindle speed between 1,500 and 3,000 r.p.m. can be instantly obtained.



"Standard" Type 1BVB Buffing and Polishing Machine

Especially useful in the buffing and polishing of small parts, the Standard Type 1BVB Machine, through its variable speed control, permits the spindle speed to be increased for maintaining correct peripheral speed of wheels as they become worn. The unit illustrated herewith is a bench model and is equipped with flanged spindles but can also be furnished on order with taper spindles such as used in certain production and jobbing shops. The machine is also available in a pedestal model.

The "B" dimension of the unit illustrated is 6¼ inches, the "C" dimension 1¼ inches, and the diameter of the spindle between flanges ¾ inch. The distance from the bottom of the base to the center of the spindle is 10 inches on the bench model and 39 inches on the pedestal model. The distance between wheels is 23½ inches.

Meckler Process

A process for the reclamation of waste paints, lacquers, and varnishes from water-curtained booths is announced by the Meckler Chemical Corp., 3748 E. 91st St., Cleveland, Ohio. According to the marketer, the process provides for the converting of sludge into finishes which are equal or superior to new finishes.

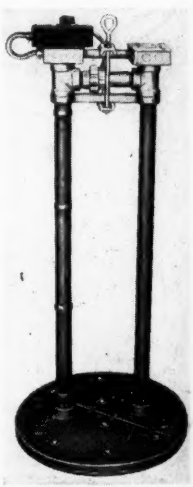
Of particular importance in recovering materials wasted in application by means of a spray gun, the Meckler Process is said to be easy to apply, rapid, economical, and to require no special equipment.

Chromalox Type DH Electric Immersion Heater

An electric immersion heater designed for heating greases, solid oil, and other compounds supplied in 55-gallon drums or similar containers has been added to the line of Chromalox heaters manufactured by the Edwin L. Wiegand Co., 7504 Thomas Blvd., Pittsburgh 8, Pa. Designated as the Type DH, the heater is available for 115 or 230 volts, single phase current in ratings up to 5,000 watts.

The Chromalox Type DH Electric Immersion Heater is of rugged construction, utilizing a large circular heating element. Steel risers enable all electrical connections to terminate in a standard conduit box for convenience of wiring. An eyebolt located at the top of the assembly allows for easy handling of the heater.

Uniform heating of material is said to be obtained by placing the heater in the drum and allowing it to melt its way to the bottom. An adjustable thermostat limits the operating temperature if the heater is allowed to operate unattended. The weight of the heater permits it to settle rapidly in the drum, and the large heated area is said to provide for uniform heating and eliminate cold regions.



Chromalox Type DH Electric Immersion Heater

Manodyz Process for Magnesium

Manodyz is an electrolytic process offered by the Hanson-Van Winkle-Munning Co., Matawan, N. J., which produces a protective and decorative magnesium-oxide-silicate film on magnesium alloys. The function of the coating is similar to the aluminum oxide film on anodized aluminum alloys.

Either an alternating current or a direct current which will deliver 4 volts to the Manodyz tank is needed. According to the type of current, the process is referred to as the Manodyz (AC) or the Manodyz (DC). The DC process requires a current density of 10 to 20 amperes per square foot. The AC process requires a current density of 20 to 30 amperes per square foot. Under normal operating conditions, parts may be completely processed in 30 minutes.

The AC process is preferred with narrow gauge wrought alloys (under 0.064 inch), while the DC process may be used with heavier gauge wrought alloys and is preferred for castings and intricate shapes. If both alternating and direct current are made available for Manodyzing, the process becomes extremely versatile. The DC process has the better throwing power, approaching that of the well-known chromic acid anodizing process for aluminum alloys. The AC process has only slightly less throwing power than the DC.

The AC process produces a light to dark-gray film on Fs, Js, H, G, C, O and X Alloys. A light gray film is developed on M Alloys. The DC process produces a pale-dark green film with Fs, Js, H, G, C, O and X Alloys, and, on M Alloy, a pale brown coating is produced.

Both finishes may be dyed practically any color desired by employing selected organic acid or chrome dyes in a manner similar to the technique used in dyeing anodized aluminum parts.

The AC finish may vary in depth from 0.0002 to 0.0005 inch. The DC coating may vary in depth from 0.0004 to 0.001 inch. The AC film penetrates into the metal, giving very little build-up in dimension. The build-up of the DC coating is appreciably greater than the AC, and its penetration into the metal is equal to approximately one-half the total thickness of the DC film.

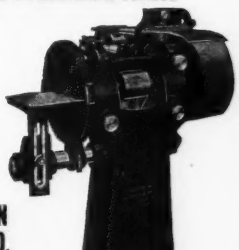
The coating produced by the AC process is very dense and compact. It shows no visible porosity when a cross section is examined at 250 magnifications. The DC film, which has greater depth, reveals some visible porosity under the same test conditions.

FOUR IN ONE

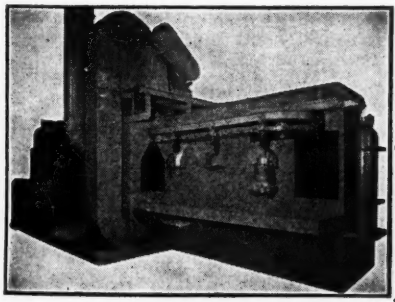
Grinding and Polishing Machine

This type R machine is a combination of several types of grinding and polishing machines. It can be used for disc grinding—polishing—burring and surfacing.

Write for illustrated folder



PRODUCTION MACHINE CO.
GREENFIELD, MASS.



HYDRO-FLOW

INDUSTRIAL WASHING MACHINES

Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

INTERNATIONAL CONVEYOR & WASHER CORP.

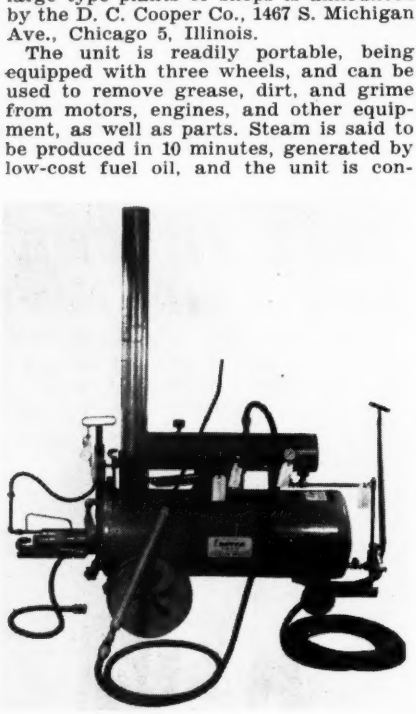
Write for circular.

652 E. FORT ST. DETROIT 26, MICH.

Cooper Industrial Steam Cleaner

Described as very simple and economical to operate, an automatic generating type industrial steam cleaner designed to meet the requirements of small type or large type plants or shops is announced by the D. C. Cooper Co., 1467 S. Michigan Ave., Chicago 5, Illinois.

The unit is readily portable, being equipped with three wheels, and can be used to remove grease, dirt, and grime from motors, engines, and other equipment, as well as parts. Steam is said to be produced in 10 minutes, generated by low-cost fuel oil, and the unit is constructed to maintain a pressure of 70 pounds.



Cooper Industrial Steam Cleaner

Welco Improved Fog-Free Goggle

Improvements in the design of its Welco Fog-Free Goggle are announced by the Welsh Manufacturing Co., Providence, R. I. Improvements include a modification of the interior design of the goggle to ensure a better fit around the nose and greater comfort for the wearer. In addition, an easily attached and removable tinted slip lens is now available to provide glare protection, as well as for increased impact resistance.

Welco Improved Fog-Free Goggle

The large, plastic Polaroid non- polarizing lens of the goggle provides for wide, unobstructed vision and is said to be nonshatterable. Normal breathing provides for a complete change of air in the lens chamber approximately once every second. This air sweeps away all moisture entering the chamber from around the eyes before it can condense on and fog the inner surface of the lens, the manufacturer states.

The Welco Improved Fog-Free Goggle is said to be particularly useful for splash protection in the handling of corrosive acids and alkalies and for the cleaning, inspection, or repair of furnaces and boilers.

Phillips "PSC" Emulsion Cleaner

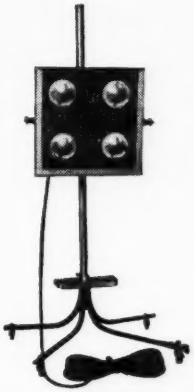
The Phillips Chemical Co., 3422 W. Touhy Ave., Chicago 45, Ill., announces an emulsion type cleaner for use in power spray washers. Designated as the "PSC," the material is designed to clean ferrous and non-ferrous metals and to inhibit them against rust, corrosion, and hand soil. According to the manufacturer, it is non-toxic and noninjurious to the skin or open cuts, requires no rinsing, and will keep the washing tank clean.

Economical to use, PSC can be diluted with water in proportions of from 1 to 10 to 1 to 100, depending upon the type and amount of soil and the length of time rust resistance is desired. For complete cleaning and rust inhibition, parts need only be washed and blown dry with air, it is claimed. PSC is said to remove grease, oil, wax, lapping and

drawing compounds of all kinds, red lead and other markings, abrasive dust, chips, and filings from the inside as well as outside surfaces of workpieces.

Claimed to accomplish its unusual cleaning action as a result of high penetrating properties and a "blanket overflow" action, Phillips PSC Emulsion Cleaner penetrates to the surface of the metal, breaking the soil into tiny particles which rise to the top of the solution in the tank and are held in the PSC "blanket" while heavy solid particles sink to the bottom of the tank. The "blanket" may be periodically overflowed, thereby keeping the bulk of the solution in the tank clean and avoiding the washing of other parts with soiled cleaner, as well as reducing the strain on pumps and lessening the possibility of spray nozzles becoming clogged.

PSC is available in three types; namely, No. 1 for light duty, No. 2 for heavy duty, and No. 3 for special rust-resistant qualities. Depending upon the type of PSC used and the degree of dilution, all metal parts are inhibited against rust, corroding, and hand soil long enough for inspection or storage up to several weeks, with the parts being readily suitable for painting or other finishing, it is claimed.



Arno Model P-104 Portable Infra-Red Unit

Arno Model P-104 Portable Infra-Red Unit

Designated as the Model P-104, a portable infra-red unit for drying, heating, and dehydrating operations is now being marketed by the Arno Manufacturing Co., 327 S. LaSalle St., Chicago, Illinois.

The unit is provided with four swivel casters for ease of movement, with the heating device itself being adjustable up to 5 feet from the floor. The unit can be used with either 250 or 375-watt rectifier type infra-red lamps.

ROLL Out the BARRELS!

- Tumbling Barrels
- Deburring Barrels
- Plating Barrels
- Large Barrels
- Small Barrels
- Medium Sized Barrels
- Horizontal Barrels
- Oblique Barrels
- Adjustable Barrels
- Jewelers' Barrels
- Utility Barrels
- Steel Barrels
- Rubber Barrels
- Bakelite Barrels
- Single Barrels
- Double Barrels
- Multiple Barrels
- Barrels of Cleaner
- Barrels of Glue
- Barrels of Emery
- Barrels of Metal Salts
- Barrels of Polishing Compound

BARRELS! BARRELS! BARRELS!

MUNNING & MUNNING, Inc.

Designers Engineers Manufacturers

Electroplating Equipment and Supplies

202-208 Emmett St., Newark 5, N. J.

New York Philadelphia Woonsocket, R. I.

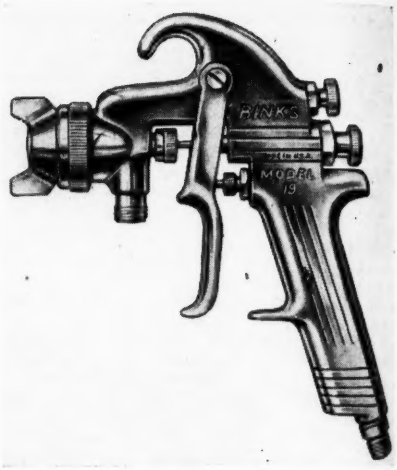
Binks Model 19 Spray Gun

Desiginated as the Model 19, a lightweight spray gun with several improvements over prewar models is announced by the Binks Manufacturing Co., 3114 Carroll Ave., Chicago 12, Ill. Well balanced, the gun, which weighs 1 lb. 7 oz., is designed to fit the hand comfortably and is said to be extremely easy to operate.

According to the manufacturer, a large air passage through the gun results in maximum utilization of the air. All controls of the gun are conveniently located at the back, and the spray pattern is quickly adjustable from round to flat with all widths in between.

The Binks Model 19 Spray Gun includes few parts, thus making it easy to take apart for cleaning or repairing. The body is made of lightweight durable aluminum, the air nozzle of bronze, and the fluid nozzle of a special hardened steel. The entire gun is heavily nickel plated. A hardened plate is provided at the point where the trigger contacts the air valve stem to prevent wear.

Special features of the Model 19 include a nozzle of the self-centering type, designed on the tapered seat principle to prevent air leakage. The air valve is of the cartridge type, and hose connections are standard. The needle valve is easily adjustable.



Binks Model 19 Spray Gun

A special adaptation of the Model 19 is the Model 19V for ceramic finishing. It is identical to the Model 19 except for the material nozzle and needle valve which have tungsten carbide inserts to protect them from the severe wear of the abrasive materials and to provide the gun long life.

Clean Spray Booths

Spray BOOTHCOTE on clean booth.
Paint peels off in sheets.
NO SCRAPING—SAVE TIME and LABOR
Trial offer 5 gal. $5.50 F.O.B. Buffalo
Used by 2000 leading manufacturers.
MONEY BACK IF NOT PLEASED.
Write for Circular.
HYGRADE FOOD PRODUCTS CORP.
HARRIS SOAP—BOOTHCOTE DIV.
19 Stetson St., Buffalo 6, N. Y.

Rolox Vinyl White Enamel

Designed to fill the need for a one-coat material with maximum resistance to food acids and fats and with stability under high and repeated baking temperatures, a vinyl white coating enamel to be known as Rolox is now being manufactured by Roxalin Flexible Finishes, Inc., Elizabeth, N. J. An outstanding characteristic claimed for the material is its extremely high solids—52 per cent.

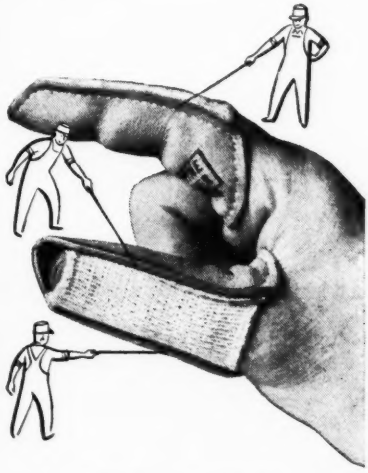
According to the manufacturer, Rolox Vinyl White is stabilized in the process of manufacture and will not disintegrate in contact with metals at elevated temperatures. Excellent adhesion is said to be obtained even when the material is applied directly to under-size black plate, electrolytic or hot dip tin. This feature, in addition to the extreme flexibility char-

acteristic of the formulation, is claimed to make the coating ideal for the exact requirements of screw-cap work.

Rolox Vinyl White is described as having excellent original color and color retention and, since it will not discolor even under repeated bakings, is said to provide an unusually fine, durable base coat for multi-color lithography. Odorless and tasteless, the coating is also claimed to resist sterilization and food processing.

"Steel Grip" Supergard No. 15249

Known as the "Steel Grip" Supergard No. 15249, a protector for thumb or finger in performing buffing, polishing, grinding, sanding, and other operations, as well as for use in assembly work, is now being manufactured by the Industrial Gloves Co., 7152 Garfield Blvd., Danville, Ill. The protector is designed so that the leather wearing surface extends two thirds around the finger, thus affording maximum protection to the wearer. In addition, the seams are located well up on the sides of the finger and out of the wearing zone to provide for long life of the guard.



"Steel Grip" Supergard No. 15249

The Steel Grip Supergard No. 15249 is available in small, medium, and large sizes and in three materials—cowhide split, grain leather, and capeskin.

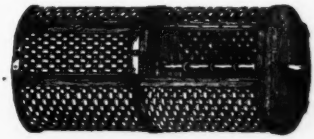
If its metal polishing or metal finishing you want, check LUPOMATIC.

For efficiency in finishing metal parts, install a DEBURRMASTER.

Save time, money and produce assured results.

LUPOMATIC TUMBLING MACHINE CO., INC.
4510 BULLARD AVE. BRONX, N. Y.

Inexpensive, light in weight. Easy to install and operate.



King White-Oak Plating Barrel

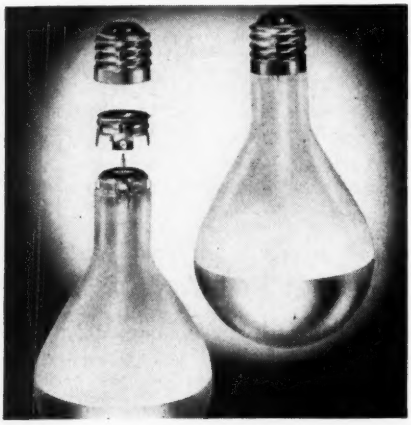
becomes a sub-anode, thereby producing a cleaner, brighter plate. Less plating time is required to put on the desired thickness of plate.

Send for catalogue and specification sheets.

JOHN KING 48 SPRINGFIELD ST. DAYTON 3, OHIO

Wabash-Birdseye Lamps with "Superlok" Construction

"Superlok," a construction which is said to provide for the permanent lock-



Wabash-Birdseye Lamps with "Superlok" Construction

ing of the bulb to the base, is now standard on all large Wabash-Birdseye lamps offered by the Wabash Appliance Corp., 345 Carroll St., Brooklyn 31, N. Y. Designed to eliminate base cementing and neck strapping, the construction consists of a threaded collar which is screwed into and notch-locked to the lamp base, with the collar claws gripping the dimpled neck of the glass bulb. The result is a permanent lock that cannot be separated by the weight of the bulb, position of burning, heat, or age, it is claimed.

All standard-line Wabash - Birdseye lamps from 300 watts and upward and all reflector lamps and industrial infrared heat lamps are available with the Superlok construction.

"Tite-Wite" Porcelain Enamel

The O. Hommel Co., Pittsburgh, Pa., has announced the development of a porcelain enamel, to be known as "Tite-Wite," for the refrigerator, stove, washing machine, kitchenware, sign, and architectural industries.

A super opaque white cover coat available in both regular and acid-resisting porcelain types, the enamel can, it is claimed, be applied nearly as thin as the best organic paint finishes. Tests are said to have shown reflectance readings of 75 to 80 per cent and over when applications of 15 to 20 grams per square foot were made, thus reducing chipping.

Japan Roller Coating Process

A method of roller coating, by means of which many metal, wood, and plastic products can be finished before stamping, forming, or other fabricating, has been developed by the Japan Co., 5103 Lakeside Ave., Cleveland, Ohio. Combining a specially designed coating machine with carefully engineered infrared baking equipment, the method provides for the production of roller coated sheets that are completely baked in three minutes or less.

Various types of finishes are employed, including paint, enamel, lacquer, varnish, and plastic coatings. The process is designed especially for the use of vinyl base materials, which produce extremely durable coatings that are said to stand up even under the deep drawing of metal parts. All types of coating are applied with maximum uniformity of thickness, tolerances as close as 0.001 inch being held to customers' specifications, and uniform color shades, including the most delicate

Deep drawn metal cup, roller coated with a vinyl plastic coating before forming

pastels, are maintained without difficulty, it is claimed.

American NRL Model 1 Filmeter

The American Instrument Co., Silver Springs, Md., announces the American NRL Model 1 Filmeter, an electronic instrument for measuring, rapidly and non-destructively, the thickness of paint, varnish, lacquer, plastic, and other non-conducting coatings which may be deposited on non-magnetic base metals such as aluminum, brass, copper, bronze, and so on. According to the manufacturer, the instrument is designed to measure coating thicknesses from 0 to 0.005 inch with an accuracy of 3 per cent of full scale, and measurements may be made on any flat surface or on convex or concave surfaces having a radius of curvature of not less than 6 inches.

American NRL Model 1 Filmeter

The Filmeter consists of a battery-operated electronic beat-frequency oscillator contained in a 7 x 7 x 7-inch steel case. The inductance coil of one oscillator is mounted in the end of a tripod-mounted inductor and is connected to the instrument by means of a shielded rubber-covered cable. Earphones enable the operator to determine when the two oscillators are set to the same frequency. The entire instrument weighs approximately 11 lb. and may be used as a portable field instrument or on a laboratory bench.

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"Porciflex" Enamel

A high-grade baking enamel which is said to be unusually fast drying and almost indestructible has been developed by the H. V. Walker Co., Elizabeth, N. J. Known as "Porciflex," the paint, when applied to metal, provides a flexible porcelain-like finish which has a high resistance to acids, alkalies, oils, and greases.

Applied by spray, roller-coating machine, or dip, Porciflex is baked at schedules from one minute at 450 degrees for sheet steel to 15 minutes at 275 degrees for other types of work. It is also said to be well adapted to infra-red baking.

Porciflex is described as an ideal finish for kitchen cabinets, refrigerators, medicine cabinets, hospital equipment, fluorescent fixtures, signs, and other metal products. It is available in clear, black, white, and all colors. White Porciflex is claimed to have a minimum tendency to yellow with age—an important factor in household fixtures. According to the manufacturer, Porciflex will not crack or flake when struck and will not peel off under normal conditions.

StaSafe Fabric Apron with Snap-Straps

A fabric apron with snap-straps has been added to the line of StaSafe products offered by the Standard Safety Equipment Co., 232 W. Ontario St., Chicago 10, Ill. The use of web straps and sliding snap fasteners provides for quick, positive adjustment of the apron and is said to allow for instant and automatic removal in the event the apron is caught in moving machinery.

StaSafe Fabric Apron with Snap-Straps

Made of safety tested StaSafe fabric, the apron is available in a wide variety of styles and sizes in both bib and waist types. Impregnated with StaSafe compound and cured, the apron is claimed to provide protection against acids, caustics, solvents, flames, oils, and paints.

AO Sta-Set Finger Cots

Two scientifically designed finger cots, available in small, medium (standard),

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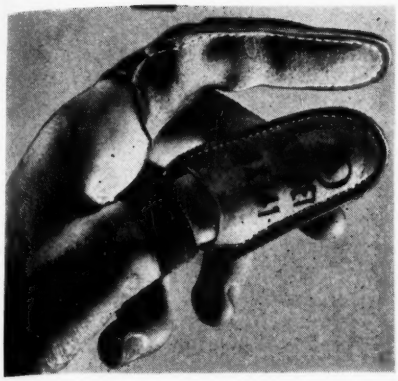

AO Sta-Set Finger Cots

and large sizes, are announced by the American Optical Co., Southbridge, Mass. One of the AO Sta-Set cots, made from selected grain leather, is said to be useful wherever sensitivity of touch is an important factor, such as in soldering small wire, assembly work, and so on. The second cot is made from high grade chrome tanned cowhide leather and is recommended for jobs involving hard usage, such as polishing, burring, and grinding small parts.

The AO Sta-Set Finger Cots provide rugged protection for both the front and back of fingers, and are designed to stay in place. According to the manufacturer, it is practically impossible to turn or twist them, even under the roughest usage. The soft, pliable leather used in making the cots plus an elastic strap in back at the bottom permits complete freedom of finger movement. The design also makes it possible to put on and remove the cots with ease and convenience.

Parkerizing in Color

According to the Parker Rust Proof Co., 2172 E. Milwaukee Ave., Detroit 11, Mich., iron and steel articles can now be given a new type of finish, produced chemically, by one new step in the Parkerizing process. This step is said to provide for the production of a prac-

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tical matte finish, in addition to providing more than twice the rust resistance of Parkerizing alone, without materially affecting dimensions.

The treatment, it is claimed, can be used to coat threaded articles, parts with holes, recesses, or angles equally as well as flat surfaces. It is said to be especially adapted to products where good appearance and rust proofing are important. Tools, building hardware, bolts, nuts, springs, and parts of mechanical assemblies, as well as household and shop appliances, are said to be ideal applications for the treatment.

Parkerizing in color (gray, green, purple, and blue) can be applied to either small or volume production and is described as a smooth, clean finish that aids product improvement.

AO Dust Goggle

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to sell buffing compounds, buffs and abrasives in Greater New York and New Jersey Area. Good salary, commission and expenses. A background of practical experience in the metal finishing field preferred. Write giving full details. Box 12, in care of PRODUCTS FINISHING, 431 Main St., Cincinnati 2, Ohio.

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PRODUCTS FINISHING

431 Main Street, Cincinnati 2, Ohio

AO Dust Goggle

for industrial and other workers is announced by the American Optical Co., Southbridge, Mass. The goggle is equipped with an acetate eyecup that permits an unusually wide angle of vision. In addition, a thin wire mesh screen on the inside of each side shield affords maximum protection against fine dust particles.

The eyecups are individually shaped to conform to the contour of the right and left eye and fit snugly against the face to keep out dust and powder. The ventilating system extends over a large area to reduce the possibility of fogging. The eyecups can be easily cleaned by a blast from an air hose or a thorough washing.

Equipped with clear AO Super Armorplate lenses, the goggle features retaining rings of solid fiber and is also available with rubber cushion on request.

Abrasive Cloth Belts. The Behr-Manning Corp., Troy, N. Y., now has available two broadsides, one of which provides information on water-proof abrasive cloth belts for popular types of wet sanding and wet grinding machines, while the other provides similar information on abrasive cloth belts for popular types of dry sanding and grinding machines. The data contained in the broadsides include listings of popular sizes and grits, as well as list prices per one-unit carton and per 100 belts. Copies of either or both broadsides can be obtained free upon request.

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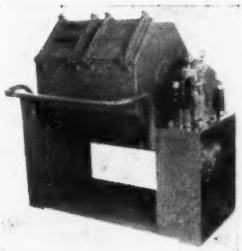

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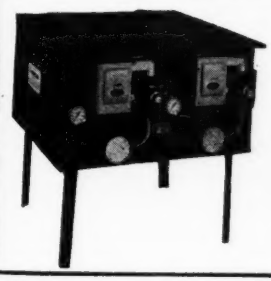

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